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DEPRECIATION OF EQUIPMENT.

STUDY OF CONDITIONS ON SOUTHERN PACIFIC LINES.

Charles C. James.

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Grateful acknowledgment is made for data and counsel in the preparation of this report to representatives of the mechanical, valuation, and accounting departments of the Southern Pacific lines; to Mr. W. C. Wishart, statistician of the New York Central lines, formerly statistician for the Public Service Commission of the State of New York, Second District, and examiner of accounts for the Interstate Commerce Commission; and to Henry R. Hatfield, Ph.D., dean of the College of Commerce, University of California, and author of Modern Accounting.

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DEPRECIATION OF EQUIPMENT

Depreciation in general.

Depreciation has been tersely defined as "loss of value." This is an acceptable definition if we define value. But value is merely a name for an idea as to which well-informed and reasonable men differ in their opinions. In the marketplace we have exchange value, which is determined by the interplay of many influences, and establishes cost to the purchaser at point of delivery. Value in use, which is contingent upon prospective utility, comes pretty close to being what our keenest competitor would pay for what we have, if he needed it as much as we do, and could afford to pay accordingly.

Value in use usually shrinks in proportion as the period of continued usefulness grows shorter. Under such conditions from the point of view of the owner there is depreciation. But also value in use may enhance if utility increases and supply grows less. Conditions that work toward this end tend to offset depreciation.

Depreciation in accounting.

In accounting, we avoid the attempt to determine value in use as long as we are sure that exchange value plus transportation charges to point of use (and perhaps final fabrication), or cost, gives us a figure not greater than value in use. Frequently cost and value in use at the time of purchase coincide for the reason that quite likely the property could readily be duplicated for a like amount and value in use cannot exceed cost of immediate reproduction or appropriate substitution.

However, as an illustration of the weakness of cost even in measuring value new, we have a very good case before us at the present time in the construction of new freight cars at the Southern Pacific Company's Sacramento shops. It is expected to build some two thousand cars that will be alike to a nail. The first lot will undoubtedly cost more than the second for the reason that the first lot will be built by men who have not yet become familiar with the work. With later lots we shall have the reduction in cost that comes with the increasing skill of men doing a familiar task and the improvement in organization that comes from its better adaptation to the work in hand. Moreover, market conditions are now so unstable that it is more than probable that material acquired for later lots will differ in price from that now on hand out of which the early lots will be built. Hence with our two thousand new cars we shall find that they cost varying amounts and yet it is clear that their values will not differ.

While cost may give us a satisfactory figure for accounting purposes because it has the merit of being definite and usually measures value pretty closely at the time property is acquired, we must always allow for the fact that even then cost is affected by differences in efficiency in construction, advantageousness of purchase, and fluctuations in the relative value of money.

Subsequently our cost figures must be modified if we are to recognize the lessening of value due to loss of utility.

For example, in the case of equipment it is manifest that its value is nearly gone when it becomes worn out or is broken; and that it is much lessened when its relative utility has suffered by

reason of the fact that while it may not itself have grown less the march of progress has brought forth equipment better suited to the needs of the new day.

Broadly stated, if the demand for equipment at the point where it has been in use comes to an end for any reason, certain elements of cost at that point must be discarded if further costs for transportation and for refabrication must be incurred to take it elsewhere and to fit it for another field of usefulness. Since its value in the new field cannot exceed the cost of reproduction we cannot include in our cost figures transportation to and fro or fabrication and refabrication because we would thereby reach a figure in excess of the cost of reproduction.

Again, all considerations of cost will have to be entirely laid aside if we can find no further field of usefulness.

The conditions that bring the demand for certain equipment to an end at a particular point, like other coming events, cast their shadows before. To the extent that they can be foreseen they reduce the value of such equipment each day as its probable service life in its present place grows shorter. Possibly we may find the value of certain equipment well-nigh gone, while it yet remains at work with unimpaired serviceability. Or, we may find that its loss of utility is temporary, if for example it can be overcome by repairs; or is local, if it can be overcome by transfer to a different point or assignment to a different service, or perhaps can be sold to another user to good advantage.

All of this goes to show that when we come to deal with depreciation we are entering a field without metes and bounds until

we first conjecture them for ourselves. Depreciation is only a relative term because it depends on the establishing of value, and value varies according to circumstances; so that we must first determine upon the set of circumstances that we expect to deal with before we attempt to find a measure of depreciation.

Serviceability.

If we consult our transportation officials, who must work with the tools that are put in their hands, we find that their work-a-day view of the value of equipment is determined according to its condition for service. If a locomotive can pull practically its full tonnage rating it is in approximately 100 per cent condition, whether its tractive power be thirty thousand pounds or sixty thousand pounds. It is capable of delivering the maximum service that may be expected of its particular kind of machine. If it falls considerably short of pulling its full rating, your trainmaster turns it over to the mechanical department for repairs. That is to say, he deals with it as completely depreciated, while as a matter of fact the trouble may be one that can be corrected at very little expense. Clearly the transportation man's view is determined by the conditions of the moment, which are too transitory to find reflection in our accounts.

Deterioration.

Nor is the purely mechanical point of view entirely satisfactory for accounting purposes for the reason that depreciation due to ordinary wear and tear of service and exposure to the elements, which may be described as deterioration, never of itself brings about the permanent retirement of equipment. According to the best mechanical

engineering opinion the physical condition of equipment based on the weighted average of its component parts - the "condition percent," as the Interstate Commerce Commission terms it, - while it varies within limits defined by the carrier's standard of maintenance, seldom if ever for serviceable equipment falls below 60% for locomotives, 55% for passenger cars, and 45% for freight and work equipment. This is because all equipment is fabricated of relatively small parts, the individual lives of which differ so that when one - or a number in combination - fails, a much larger number are in relatively good condition. (See Note A). This is clearly demonstrated by the fact that there are comparatively few instances where what we call back shop work or general overhauling entails renewal of a major part of the component physical elements of a locomotive or car, and yet we can find many units of equipment in service older than the probable life of practically any of their parts. (See Note B). An amount equal to the original cost of the locomotive is spent for repairs and renewals approximately every four years, and for cars approximately every ten years. (See Note C). Although this does not mean that the deterioration of locomotives is 25% a year and of cars 10% a year (because the net cost of renewing an entire locomotive a part at a time- expenditures less salvage recovered -exceeds its original cost) nevertheless the loss from deterioration alone during the life of equipment is from 150% to 400% of its cost.

NOTE A:- See Appendix No.1, "Extracts from expert testimony before the Texas Railroad Commission in freight rate case, September 1915; Appendix No.2, "Chart of locomotive valuations based on condition per cent."; and Appendix No.3, "Report of committee on valuation of equipment appointed in connection with Texas freight rate case."

NOTE B: See Appendix No.4, "Age of oldest locomotives in service and estimated age of principal locomotive parts."

NOTE C:- See Appendix No.5, "Statement showing annual cost to repair a a representative number of modern type locomotives during the past ten years, and number of years in which annual cost to repair equals average original cost.

Hence if our depreciation charges were to show merely the deterioration of equipment, they would be determined quite independently of the life of the entire composite unit. Charges on this basis would amount to little more than a partial equalization of the cost of repairs, that is to say, they would represent the current wear and tear of equipment, and the accrued depreciation thus set up would in all cases be chargeable with that part of the expenditures for repairs and renewals that goes to restore the original condition of the deteriorated parts. At no time, under a plan of depreciation of this sort, would we write down a locomotive to a condition percent below 60%, passenger car below 55%, or freight or work car below 45%.

Supersession

Aside from casualties, the effects of which are obvious, retirement of equipment is brought about by inadequacy and obsolescence, which taken together mean the disparity between the utility and appropriateness of equipment acquired in the past and of that particularly designed to serve present day traffic. Depreciation of this kind is relative only, external to the equipment affected. It is supersession.

Supersession develops slowly and not at all uniformly through the years, yet all of our experience teaches us that its progress is inevitable and that sooner or later new equipment will become available so much better than that now in use that we must needs discard the old and substitute the new.

This condition develops because a betterment of service is demanded, as in the case of substituting steel for wood passenger cars; or because net returns from operation will be improved enough to exceed the interest cost of the new investment, as when gas motor cars replace steam trains in local service, or heavier locomotives replace lighter ones where heavy tonnage is to be handled.

It is difficult sometimes to discern this condition for the reason that the connection is remote between the purchase of up-to-date equipment and the retirement of that which is no longer suited to the service. Ten of the latest type freight locomotives are delivered today. Sometime this year, or maybe next, a half dozen, perhaps a dozen, old light locomotives are sold or demolished. Probably some of these have been in regular service right up to the time when we rid ourselves of them. Others may have spent much of their late life in idleness, doing duty only in emergencies, because the traffic that once they served so well had outgrown them. The purchase of the new and the retirement of the old are as remotely related as the purchase of father's new suit to the throwing away of the youngest son's trousers, which were all that was left of the suit father bought six years ago and which had since served each of the boys in turn.

Supersession as we have experienced it in the past has been due to the development of more powerful locomotives and of sturdier freight and passenger cars, entailing in the case of cars substitution of steel for wooden construction.

But it must not be thought that supersession affects only light locomotives nor that all light locomotives are already superseded or likely soon to be. A locomotive, like any other machine, is efficient only if it is adapted to the work available. It would in some cases be better economy to dismantle relatively new and powerful locomotives and retain old light ones, if still newer and more powerful machines had been acquired for the heavy tonnage lines and the traffic of the light tonnage lines could be well served by the old and light and cheaply operated locomotives. (See Note D.)

Note D: - See Appendix No.6, "Average ages of various types of locomotives dismantled at Sacramento shops from 1902 to 1916, inclusive.

So far as can now be foreseen, the effect of supersession upon the future is likely to be less than upon the past. In the development of any art the greatest progress is made in its early stages. We have now seen the steam locomotive developed to a point beyond which further radical progress is unlikely. With the Southern Pacific Company all of the locomotives purchased since 1913 have been lighter than the Mallet type bought in that year. Limitations have been placed upon wheel load and both lateral and vertical clearances, so that practically the only development of the steam locomotive left seems to be the multiplication of motive power units under the control of one engineman, such as the Mallet device and the lately developed device of equipping the tender with driving wheels.

Our passenger coaches are likely soon to be all steel or steel underframe, and with seating capacity as great as safety will permit and the service requires.

Our freight cars are in a fair way to approaching standards of strength and capacity and these standards seem adequate to meet the stress of service and the needs of commerce. In fact, in the matter of capacity it would seem that with the box car at least the standards have exceeded commercial needs. For a number of years past there has been a continually growing disparity between the average capacity of cars and the average lading. Until the increase in loading recently brought about by co-operation of shippers in securing war-time efficiency, the average weight capacity has been nearly double the weight of the average load.

The fact that equipment is fabricated of relatively small parts makes it possible from time to time to apply new devices to existing equipment, and hence improvements in devices (such as superheaters for locomotives, improved draft gear for freight cars, and electric

lights for passenger cars) do not entail discarding entire units of equipment because of supersession of component parts. From actual inspection it has been disclosed that as many as fifty individual additions and betterments are frequently found on a single locomotive.

However, in spite of this appearance of stability in present conditions it is safe to assume that we have not seen the last of depreciation due to supersession. Although current loss of utility due to supersession cannot be determined by the application of any uniform rule but is ascertainable only by expert appraisal from time to time, nevertheless its inevitable effect must be recognized and provided against.

The future holds the possibilities of substituting for steam power that of electricity or the internal combustion engine, and perhaps the development of freight cars fitted to provide a higher class of service than is contemplated in the movement of maximum loads at minimum speed, for which the present equipment is designed.

Throwing an interesting light upon the probable effects of such radical changes as the substitution of electric for steam power, the Southern Pacific has its experience in the electrification of the suburban service in the trans-bay cities of Oakland, Berkeley, and Alameda. All of the equipment that had been operated in this service prior to the electrification was superseded by equipment designed particularly for electrical operation. This released 40 locomotives and 164 suburban passenger cars. In the five years that have elapsed since the electrical operations were begun, 4 of these locomotives have been sold and 15 broken up. One is now being held for sale, but the remaining 20, or just one-half have found a place in branch line or yard operations elsewhere on the system. These locomotives are now

from twenty-nine to thirty-six years old.

Of the passenger cars 46 were sold, 95 assigned to maintenance of way service, one, constructed in 1879, was broken up, and 22 are still in revenue service on branch lines.

The locomotives that were sold realized 37-1/2% of their original cost and the cars 28.03%. The locomotives sold were thirty years old and the cars sold averaged forty-one years old.

Objection has been made to accumulating a reserve by charges to operating expenses to provide for future retirement of equipment when at the time such charges are made such equipment is adequate for the needs of the existing service. It is maintained that it is not proper to charge today's operating expenses with the anticipated loss from retirement of property that will be brought about by future operating requirements, for the reason that presumably when such substitution takes place it will result in economies of operation the resulting benefits of which will be reaped by those who hold the stock at the time and subsequent to the time when it takes place. (See Note E.)

For example: Would it have been proper to charge to the cost of operating the suburban lines above referred to, during the time they were operated by steam, an amount sufficient to provide for retirement of the steam equipment in anticipation of its being superseded by electric equipment? So far as the period of steam operations was concerned no current advantage resulted from its contemplated discontinuance. Already it was inadequate and uneconomical. Why then should it be burdened with the expense of providing for its own supersession? The

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Note E: - See Appendix No.7, "Extract from decision of Supreme Court in case of Kansas City Southern Ry.Co. v. The United States (1913) 231 U.S.423", and Appendix No.8, "Reserves" by J.D.Cowan from the Journal of Accountancy, February,1917.

answer to this argument is that sound finance requires every enterprise to pay for itself and profit its owners during the time it is economically efficient. It is on this principle that we justify charges to operating expenses for insurance against future casualties.

Past experience has taught us that eventually it will become uneconomical to operate each type of equipment we buy, just as it has taught us that eventually practically all buildings will burn down. As all buildings do not burn down in their turn, so also though in somewhat less degree all equipment is not superseded in turn. Certain locomotives, for instance, forty and fifty years old may be found that are still very appropriate to the service where they are now assigned while others not more than fifteen years old have proved too light for main line traffic and too heavy for branch lines, and have been or should be forthwith retired.

The analogy is further discernible in that the insurance fund accumulated for all buildings does not indicate that all such buildings have been proportionately burned down already, nor does the accrued depreciation for all equipment represent supersession that has already taken place.

A failure to make provision for the losses of capital that the law of averages indicates are certain to occur is unwise, although it is interesting to note that such provisions are not allowed by the commissioner of internal revenue in computing net taxable income. (See Note F.) That such provisions are not an appropriate charge to current operating expenses may in strict theory be true, but so long as public regulating bodies wash their hands of responsibility for all accounts

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Note F:- See Appendix No.9, "Letter to the Corporation Trust Company, signed by W.H.Osborn, Commissioner of Internal Revenue, dated September 19,1916."

other than those that affect net operating income it is not safe for public utilities to make provisions for future contingencies through other accounts, such as accumulated surplus, which might be more in accord with correct accounting practices. Adequate provision must be made, and so long as regulation proceeds along its present path the right to do so can be established only if the reserves are set up by charges to operating expenses.

Classification Rules for Accounting for Depreciation

Looking apparently merely to the end that the difference between the cost of equipment and its ultimate scrap value shall be distributed as an operating expense charge evenly throughout the years of its life, irrespective of the loss of value of any particular year, the Interstate Commerce Commission's classification provides that the average current loss from depreciation shall be included in the operating expenses of each fiscal period from the time equipment enters service until the difference between its ledger value and its estimated scrap value shall have been credited to the accrued depreciation account. The classification further requires that the life of equipment shall be determined from the carrier's experience and best sources of information as to the effect of ordinary wear and tear of service, exposure to the elements, inadequacy, obsolescence, and other depreciation, while at the same time it requires that operating expenses shall be charged direct with all expenditures made for piecemeal renewals of equipment by means of which is overcome in a large measure the effect of ordinary wear and tear of service, and of exposure to the elements.

Considered separately for each of the component physical parts

of a unit of equipment, apparently this means, for example, that the cost (less salvage) of the two air hose on a freight car shall be charged to operating expenses in equal annual installments during the estimated life of the car, while as a matter of fact new air hose are applied probably a score of times during the life of the car, and each time the cost of renewal is charged to operating expenses through the repair account. (See Note G.)

It is clear that the commission's rule is nothing more than an attempt to deal with depreciation on the insurance principle. Monthly charges to operating expenses are required sufficient merely to provide a reserve that will take care of the amount otherwise chargeable in a lump sum to operating expenses when the time comes to retire equipment.

However, it should here be noted parenthetically that the insurance principle has not been completely adopted, in that retirement charges to operating expenses are avoided only in the case of equipment that lives its estimated life to the full or beyond. So far as depreciation charges with respect to any particular equipment have aggregated less than the full loss in its value up to the time of its retirement, the excess must under the rules be immediately charged to operating expenses through the retirement account. It is as if we insured our house with a company that would protect us only to the extent of the premiums we had paid. (See Note H.)

Note G: - See Appendix No.10, "Memorandum on depreciation" by W.C.Wishart.

Note H: - See Appendix No.11, "Suggested modification in classification rules in order to do away with inequitable retirement charges to operating expenses."

In explanation and justification of the commission's plan of accounting for depreciation of equipment it may be said that it rests on an acceptance of the fact that accounting is not an exact science. Continually it is necessary to forego the attempt to state accounts upon the theoretically correct basis because of practical obstacles. (See Note I.)

In the case of the road and structures the commission has not yet found it expedient to require carriers to charge their operating expenses with current depreciation. Until this is undertaken it will be difficult to find warrant for going very far in attempting it in the case of equipment. Sooner or later the consumption of service value of all property used in operation must be charged to operating expenses, and as long as conclusions are not drawn from the accounts of too restricted a period, probably no material error results from giving up the attempt to include in each month's expenses of operation the consumption of service value that actually takes place during the month. Over an extended number of years exclusive of the early period of operation, we get substantially the same result by basing our maintenance expenses upon expenditures for repairs and renewals.

The commission accepts this as satisfactory for road and structures, but in the case of equipment it has framed rules requiring the gradual amortization of its cost in order to guard against a form of manipulation that cannot occur to any material extent in dealing with road and structures.

Note I:- See Appendix No. 12, "Extracts from chapter on depreciation in Modern Accounting by Henry R. Hatfield."

Being movable, equipment readily lends itself to the practice of capitalizing each purchase of new equipment without making proper record of the retirement of old, for the reason that old and unserviceable equipment may be placed on a siding and allowed to remain there indefinitely - out of service, and yet not written out of the accounts. Road and structures, however, are fixed as to location, so that it is very difficult to place new in service without, at the same time, demolishing that which is displaced, hence when we account for the purchase of a new tie, a new rail, a new bridge, or a new building we find that we must needs make concurrent record of the disappearance of the old. Therefore we cannot very well have fixed improvements that have been retired from service and yet not written out of the investment account.

Recognizing the restricted purpose of the commission's rule for accounting for depreciation of equipment, it may be accepted as sufficient for the needs of the case; but care should always be taken to keep in mind the fact that it gives us nothing on our books to represent the depreciation - the loss in value - of the equipment that is in service. This is obtainable only by an expert appraisal from a physical inspection. The value thus determined must be contingent upon the circumstances in which it is to be considered, whether as value in use or as exchange value, and in either case it will be dependent upon current market prices, existing state of repair, and suitability for contemplated use.

Basis for computing rates

Turning our backs squarely then upon the attempt to reflect current loss of value in our accounts and working on the basis of merely amortizing the first cost of equipment in equal annual installments over the estimated life of equipment, we must determine our rates of depreciation according to our past experience with retirements of equipment except so far as we may conclude that future conditions will differ from those of the past and will thereby have a different effect upon the life of equipment.

A factor for which due allowance should be made in considering the significance of past experience is the probability that in many instances in the past equipment has been maintained after it had become economically superseded. Under the old plan of accounting for depreciation only when retirement occurred, the operating officer must frequently have put off retiring equipment because he did not want to assume the resulting heavy charge to his current operating expenses by which the efficiency of his supervision was judged.

Retirements have been defined in the classification as complete retirements, transfers from one class of equipment to another, and rebuilding at a cost amounting to the major part of the appraised value when restored to service.

Retirements, however, under any other circumstances than where the equipment is demolished and sold for scrap must be left out of our experience tables, because the classification requires that depreciation shall be computed to cover the entire difference between ledger value and scrap value.

Equipment that may be retired without being demolished is usually disposed of more profitably than by scrapping, that is to say, a certain element of service value still remains, and hence such retirements must be considered as premature and must be left out of consideration in setting up depreciation to conform to the classification requirements. As a matter of criticism it may be here suggested that the classification rule might better require that depreciation charges cease when the estimated salvage value shall have been reached rather than the estimated scrap value for the reason that experience shows that in a great many cases equipment is sold as secondhand after it has been fully depreciated in the accounts, and in all such instances the difference between the amount realized and the estimated scrap must be credited back to operating expenses. Such credits would be minimized by depreciating only to the average percentage of recovery.

Retirements due to casualties, which are also premature, must likewise be excluded from tables of average life of equipment on which depreciation rates are to be based, because of the commission's rule that the depreciation of equipment retired before the end of its estimated life shall in each instance be charged to the accrued depreciation account only to the extent of the credit in that account in respect of the retired unit. If we were to accumulate depreciation upon the basis of the average life of all equipment we should have a reserve sufficient to provide for the retirement charges in connection with all equipment, hence so far as these retirement charges must go into operating expenses independently, we must make appropriate modi-

fication in the accumulation of our depreciation or we shall have excessive charges to operating expenses as long as such premature retirements continue. Conversely, we should find that we had completely depreciated all of the equipment acquired at a particular time considerably before it had all gone out of service, so that with respect to each year's purchases of equipment there would come a time when that which outlived the average life would have been fully depreciated in our accounts, while as a matter of fact a great many years of service life would still remain to be obtained from such equipment.

Retirements due to transfers from one class of equipment to another are not as a rule premature from the standpoint of supersession. They consist for the most part of conversion into work equipment of superseded passenger and freight equipment.

The rule of the classification regarding equipment rebuilt at a cost amounting to the major part of the appraised value when restored to service is comparatively new and untried as well as little understood. Since no trustworthy figures are available to show the effect of its application it would better be left out of consideration in determining depreciation rates. (See Note K.)

CONCLUSIONS

Since it is clearly the intent of the commission's rules that the operating expenses of each fiscal period shall be charged with an appropriate part of the entire amortization of the cost of equipment in service at the end of the period, depreciation rates must be based

Note K:- See Appendix No.13, "Accounting for rebuilt equipment."

upon a fair expectancy of the life in service, excluding sales, casualties, and all other premature retirements. It is as if we were dealing with the expectancy of life for a man in his prime. Mortality tables tell us that a man in good health thirty-five years old has a further expectancy of life of thirty-two years, although this means merely that he will live to be sixty-seven or more if he is not one of the forty-five out of every hundred of his class that die younger.

In order to base our conclusions then upon the history of retirements of each class of equipment after it has reached its prime, tables have been prepared to show the history practically up to date of all equipment that was over twenty years old on January 1,1910. (See Note L.) In preparing these tables the history of equipment has not been recorded subsequently to October 31,1915, for the reason that after that date the existing abnormal demands for equipment have deferred retirements that would have taken place in the ordinary course of business. Hence it has been thought better to leave out the subsequent period for the reason that the fewer retirements that have taken place since that date would, if allowed to enter into the computation, reduce the average retirement per year below normal.

LOCOMOTIVES

Of the 580 locomotives over twenty years old January 1,1910, 200 had been retired (up until) before October 31,1915, and of these, 150 had been dismantled. The average life of these dismantled locomotives was 31 years, and the average salvage recovered was 8.55%, which gives

Note L:- See Appendix No.14, "Record of old Southern Pacific equipment."

an annual depreciation rate of 2.95%. However, the remaining 380 locomotives - 66% of the total - were 29 years old and even if war conditions had not intervened to reduce the normal rate of retirements it is fair to assume that these 380 would have remained in service long enough considerably to increase the average life for all. So that if we had the history of these locomotives up to the time they had all been retired under normal conditions, we should find their average life considerably exceeded 31 years. Probably 35 years would be found to be the average, giving us a depreciation rate of 2.61%.

However, it must be remembered that we are here dealing with old light locomotives, the usefulness of which on branch lines gives them a service life considerably in excess of that of heavier power, such as has been purchased of late years. Experience has shown that on a large railroad system such as the Southern Pacific the service life of all types of locomotives is very much greater than on lines where no great diversity of operating conditions exist, but even on the larger systems it has been found that the longest-lived type of locomotive is the old American 8-wheeler. If we are to adopt one rate of depreciation for all locomotives, and this seems the only practical plan, probably we shall find that 3% per annum with an estimated salvage of 10% will give us results that are conservative and satisfactory, although an annual rate of 2-1/2% or even of 2% might be found more equally to distribute depreciation charges among fiscal years as long as the commission's present rule is continued that requires charging a part of the loss from depreciation direct to operating expenses in all cases of equipment that lives less than the estimated average life,

PASSENGER-TRAIN CARS

Of the 630 passenger-train cars over twenty years old January 1,1910, 223 had either been dismantled or converted into work equipment prior to October 31,1915. Their average life was thirty-six years, and the average salvage recovered was 30.15%, which gives an annual depreciation rate of 1.94%. However, as in the case of locomotives, the remaining 360 cars still in service which averaged thirty-two years old at the end of the period, will likely live long enough considerably to increase the average age for all. It is possible that if all could be taken into consideration under normal conditions the average life would be found to be around forty years, giving a depreciation rate of 1.75%.

If no extraordinary conditions were to be looked forward to this would be a fair rate, but agitation has been under way for some years to bring about federal legislation compelling retirement of all wooden passenger equipment in interstate commerce. There seems strong likelihood that this will be accomplished within a few years at the most. Of the 2,451 passenger-train cars owned by the Southern Pacific lines June 30,1916, 1,345, or more than 50% were wood. Of the total number 17%, which means approximately 31% of the wooden cars, had been depreciated down to 15% on the books by application of an annual rate of 4%. (See Note M.) It would seem wise to continue this program until similar provision has been made for all wood cars, although it may be that when such legislation is finally passed appropriate

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Note M:- See Appendix 15, "Statement of number of units of rolling equipment owned, cost, depreciation, and number of fully depreciated units at close of fiscal year ended June 30, 1914, June 30,1915, June 30,1916, and December 31,1916."

recognition will be given to the equity of conceding increases in current revenues by means of increased passenger fares sufficient to impose the cost of the change on the traveling public that will get the benefit of the substitution.

The first steel passenger-train cars were purchased by Southern Pacific lines in 1907, although it was not until 1911 that this company adopted the policy of purchasing only steel or steel underframe passenger-train cars. Consequently experience with this type of equipment has been too limited to draw any conclusions as to its average life, but it is the opinion of the company's mechanical engineers that it will be found to have a life equal to or exceeding that of wooden passenger cars, although the value of scrap recovered will probably be less. It is understood that the Interstate Commerce Commission looks with disfavor upon any annual rate of depreciation less then 2%. Hence, while a lower rate for steel passenger-train cars might be found adequate, the 2% rate may well be adopted for when we get below this rate we are dealing with differences too small to be of importance. By reason of the fact that large use will doubtless continue to be found in work service for superseded passenger equipment, a salvage allowance of 30% will serve.

FREIGHT-TRAIN CARS

Of the 2,116 freight-train cars over 20 years old January 1,1910, 1,433 had either been dismantled or converted into work equipment prior to October 31,1915. Their average life was 27 years, and the average salvage recovered was 30.81% which give an annual depreciation rate of 2.56%. The 341 still remaining in service averaged 32 years old or 5 years in excess of the average age of those retired. This is accounted

for by the fact that the original cost of those retired was only $536.22, while that of those still in service was $853, the considerably lower cost of those retired indicating that the conditions which brought about retirement were frailty of construction and small capacity. Since practically all of the old small capacity cars have been retired, it is probable that cars now in service will have a longer average service life, although of course not necessarily up to the average age of these relatively few old cars that still remain out of the entire number here in question.

As in the case of passenger equipment, experience with steel freight cars has been too short to give us any history of their average life. It is the opinion of mechanical engineers that their average life will probably fall somewhat short of that of wooden cars. This is due to corrosion of parts where paint cannot be applied to prevent it, as for instance in the case of the inside of gondola cars that carry coal and ore. The salvage that will be recovered from steel freight cars will likely be slightly in excess of that recovered from wood, when both conversion and dismantling are taken into consideration.

In view of all these facts an average life of 28 years for both wood and steel freight-train cars seems fair to expect with a salvage recovery of 30%, giving an annual depreciation rate of 2-1/2%.

WORK EQUIPMENT:

By far the larger part of work equipment consists of superseded passenger and freight cars that are spending their second-childhood resting on outfit-spurs or hobbling up and down the road on domestic errands. Their ledger balue, by reason of being based on their depreciated value at time of conversion plus cost of conversion, stands at about 43% of their original cost. When retired the salvage realized equals about 19% of original cost so that during their life as work

equipment merely the difference between these two percentages (24%) represents the depreciation assignable to their service as work equipment. Their average period of service as work equipment being 8 years, the annual depreciation charge should be 3% of original cost.

Such work equipment as wrecking derricks, pile drivers, steam shovels, ditchers, and ballast cars spend all of their life in work service, hence the entire difference between their original cost and salvage must be pro rated to operating expenses over their entire life. Experience with such equipment has not been broad enough accurately to measure its average service life. If we use the same rate of depreciation for it as for converted work equipment, i.e., 3%, and the same salvage allowance of 19%, giving an estimated life of 27 years, the results probably will not be far wrong.

GENERAL:

In application, the foregoing depreciation rates will be found to spread depreciation charges over a life usually somewhat greater than the basic average life from which the rates are derived, due to the fact that from time to time additions and betterments will be made to equipment after it has been in service for a while, thereby increasing the total amount to be written off to reduce the book value to the estimated salvage allowance. To illustrate, assume a car costing $1,000, and depreciated at the rate of 2-1/2% on first cost for ten years, at the end of which time additions and betterments are applied costing $200; Accumulated depreciation for the first ten years at 2-1/2% on $1,000. per annum would amount to $250. The salvage allowance of 25% of the revised original cost of $1,200 would be $300, leaving $650 to be charged to operating expenses through the depreciation accounts after

the additions and betterments are made. It will take nearly 22 years more to do this or a total depreciation period of nearly 32 years as compared with a basic depreciation of 30 years from which the 2-1/2% rate was derived. A similar prolongation of the depreciation period will take place when a car has been retired and replaced in the records as a rebuilt car in accordance with the classification's "major portion" rule.

It will be noted that the foregoing salvage allowances are based upon experience during a period when conditions may be said to have been normal. Clearly they will be entirely too low so long as the present high price of material of all kinds continue. On the other hand a very much smaller percentage will probably be realized in the future when we retire equipment purchased during the present period of high prices. It is not apparent how these fluctuations can be provided against without undertaking a degree of accounting refinement that would be unwarranted in the practical application of conclusions derived from premises entirely too broad to reflect short lived influences.

When putting into effect the revised depreciation rates the accrued depreciation to date of equipment in service should be restated on the basis of the new rates.

APPENDIX NO.1.

EXTRACTS FROM EXPERT TESTIMONY BEFORE THE TEXAS RAILROAD COMMISSION IN FREIGHT RATE CASE,

SEPTEMBER, 1915.

DIRECT TESTIMONY OF A.H.OELKERS, MECHANICAL ENGINEER, SOUTHERN PACIFIC LINES.

Page Reference

Mr.Garwood: Is it possible, therefore, to estimate the life of a locomotive independent of the life of the particular parts? Must you not in dealing with the life and value of a locomotive have reference to the several parts of the locomotive? 1602

Mr.Oelkers: Yes, sir. After a locomotive has been in service you have no conception of its condition or its transportation value without knowing the detail of each part, and figuring the life and condition of each part separately.

Mr.Garwood: You have heard figures quoted and statements made as to what is called the average age of a locomotive. It has been given at varying periods - from nineteen to twenty-eight years. Does that age, or that computation in reaching age include what is called obsolescence, - wrecks and incidents of that sort?

Mr.Oelkers: It probably does. But so far as determining an average age of a locomotive - I don't know if we have statistics in the United States or the entire world to determine that - of the present design, - the present standard design of locomotives used in the United States. The design has practically not been changed since about 1875 and all locomotives of that date are even now maintained in thorough condition and in service.

Mr.Garwood: Can you by reference to the birth date of a locomotive, - that is its book age, without considering the different parts of the locomotive, - their renewals, replacements, etc., arrive at any just or adequate idea as to the value or efficiency of the locomotive?

Mr.Oelkers: No, sir.

Mr.Garwood: Why not? 1603

Mr.Oelkers: When a locomotive is put in service new, or in thorough condition its depreciation is at least fifteen per cent per year. Its value and condition drops down very rapidly. After a period of two and one-half or three years it is so low it must be brought back up. Therefore, the value of a locomotive, in actual service, drops down in a period of two or three years - then it is brought back up to possible ninety-eight or ninety-nine per cent of its original condition, and in actual value sometimes higher than one hundred per cent of the original value on account of the improvements made when parts are renewed. That will keep up from year to year as the locomotive is in service; and, if you want -- wish to determine the value of any particular time you have to know the condition of the locomotive at that time, because it may be near the top or near the bottom of its operating range.

Mr.Oelkers: The locomotive starts in condition as one hundred per cent. It gradually declines, - from the service you give it, - until it is probably sixty per cent. At that time the 1628

locomotive requires a general overhauling and the parts that are then worn out are renewed; and, the parts that are worn so as to require repairs are repaired at that time. After the engine comes out of the shop the condition goes up into the nineties, and that takes place time and again.

Mr.Oelkers: I said an engine very quickly depreciated when it is carried in the service. 1643

Chairman Mayfield: When it gets a certain age, then you repair it until it gets back just as good as it ever was?

Mr.Oelkers: Yes, sir, an engine will depreciate, I suppose, somewhere between 14 and 18 per cent, that is, taking an average, per year.

Chairman Mayfield: It gets down to 60 per cent? Unless you keep it up?

Mr.Oelkers: But as soon as it gets down----

Chairman Mayfield: To 60 per cent?

Mr.Oelkers: Well I can't say it is definitely 60, but somewhere in that neighborhood, you have to repair it and get it back into condition.

Chairman Mayfield: Now I have got a buggy, and I have had it 7 or 8 years, and I gave $300.00 for it - - 1678

Mr.Oelkers: Yes, sir.

Chairman Mayfield: And I had it fixed up, and it runs all right, but I don't think it is worth $300.00 now.

Mr.Oelkers: Well now let's take the case of a buggy or an automobile--

Chairman Mayfield: All right.

Mr.Oelkers: Of course an automobile apparently depreciates rapidly, very rapidly, but now if you had a great number of automobiles and you wanted to haul, say freight, with them, or any kind of commodity, and that was your prime object, to haul up to a certain speed, you wouldn't care about the outlines of that automobile---

Chairman Mayfield: No.

Mr.Oelkers: Nor whether it had the latest electrical devices, or whether the buttons were very convenient, but the amount of commodity it could start off with conveniently when you wanted it for convenient service. Now then if you had a number of those automobiles, you could maintain them indefinitely, and economically too, if you could get your work done at a nominal 1679 price; that is, instead of paying as the actual practice is, 80 cents for mechanics, you could hire mechanics for 35 or 40 cents an hour, and buy your repair parts at the actual value of such material as they are, then you would never arrive at the time when it would pay you to scrap any of those automobiles.

Chairman Mayfield: No.

Mr.Oelkers: Because as the parts wear out, you would replace them right then and there. In fact, you would get full value out of every part, instead of running the whole thing down and saying it has run out and having to scrap the whole thing.

Chairman Mayfield: I understand that, but don't it strike you, sort of shock you---

Mr.Oelkers: But even now----

Chairman Mayfield: That any kind of machine that is 40 years old

is worth 85 per cent of what it originally cost? Don't that sort of thing sort of want to make you back off?

Mr.Oelkers: Not in this case, not the slightest, because an automobile is not even a fair comparison. The locomotive to too old a standard, and in principle it is so simple that the simplicity of the principle has never been changed. It isn't practical to change it. In Europe they have built balance compounds and many other types, but for the service demanded in America, the simple cylinder and simple boiler and firebox----

Chairman Mayfield: If you are an expert, if you can just imagine yourself just an ordinary human like me, wouldn't you sort of back off if anybody told you a piece of machinery 40 years old--- 168

Mr.Oelkers: I can well understand your position, yes, sir, because when you say 40 years old, that has quite an influence on your mind, because it is that way with everything else, but I wish I could explain it better, but that isn't the case with a locomotive.

Question: Well let me ask you, at 40 years, the only thing about the engine that is 40 years old is the number and perhaps a very----

Answer: Well that is probably the case, yes, sir:

Question: Yes?

Answer: The boiler has a very long life, and it might last 100 years.

Question: What is that?

Answer: The boiler has a very long life and it might last a hundred years.

Question: So it isn't a proposition of a single element of deterioration; it is a composite machine of separate and independent

elements, and when you say that a locomotive is 40 years old, it don't mean that the essential parts of the locomotive---

Answer: No, sir.

Question: Are 40 years old?

Answer: No, sir.

Question: The number is about all that remains of the original machine often?

Answer: Yes sir.

For all locomotives owned by the H.& T.C. Mr.Oelkers found their condition per cent to be fifty-four. 1695

EXTRACT FROM ARTICLE "DEPRECIATION" WRITTEN BY R.J.TURNBULL, MECHANICAL SUPERINTENDENT OF THE MISSOURI PACIFIC RAILWAY COMPANY. 1724

"Different conditions have to be considered in considering depreciation for valuation. The Federal Law for valuation of railroads provides: 'The depreciation required to be taken into account in the Schedules arises from use and decay and does not include that resulting from obsolescence and inadequacy'; therefore for valuation consider Engine No.2 on table. This engine cost in 1905 - $14,250.00, has cost annually since for running repairs $2,003.00. This amount represents daily expenditure to maintain 100% efficiency and keep up such wear and tear as cannot be let run till engine is shopped for the regular general or thorough repairs, which is given approximately every two years, or 75,000 miles, and is shown as costing an average of $1500.00 per year, or $3000.00 per shopping. This provides for maintaining engine for 100 years if necessary, as all parts requiring it are renewed as worn out, and these renewals extend over a long period of years;

fire boxes approximately every ten years; boilers, from past experience, every twenty years; other heavy parts running from seven to twenty years.

"Therefore it is evident that the condition per cent is 1725 100 every time engine is turned out after receiving one of these thorough repairs. So, the only charge that could be made to depreciation would be based on the number of months in service past the thorough repair period. If this period is as outlined above then the charge to depreciation would be 1/12 of $1500.00, or $125.00 each month up to end of two year period.

"PASSENGER AND FREIGHT CARS."

"Statement also shows passenger and freight car equipment of various classes which have been retired as inadequate. With each list one of the more modern cars is shown, which are in regular service, and as in the case of locomotives, their life is shown on the average of past experience as also an increased period of service which is only reasonable to expect from modern equipment.

"From these figures it can be seen that with a proper program of maintenance, such equipment can be kept in service indefinitely, if it does not become inadequate to the needs."

CROSS EXAMINATION OF MR OELKERS:

Mr.Gray: Now, then, you testified to the fact that an engine would 1743
live indefinitely under the care--the efficient supervision
of the H.& T.C.Railroad. Tell us now how long one would
last, a boiler in average shape of the H.& T.C.Railroad? 1744

Mr.Oelkers: How long a boiler would last on the H.& T.C.Railroad
in average service?

Mr.Gray: Yes.

Mr.Oelkers: From actual experience and past records that question cannot be answered, because the age of serviceable boilers is represented in some cases by as high as forty years. Now, if there should be an exception of a boiler being actually worn out to the extent that it was more economical to put a new boiler in its place, that would be an exception, and I cannot say from a record of boiler replacements what would be an average age of locomotive boilers, but I would commit myself to the extent of saying that it would not be less than forty-five years, the average age of the boiler proper.

Mr.Gray: Well, now, in ascertaining the value of a boiler would you look up the records to see how long it had been in service on an engine?

Mr.Oelkers: To determine the value?

Mr.Gray: Yes.

Mr.Oelkers: To determine the value of a boiler I would start with that large portion of the boiler--the fire-box, which, on account of service, wears out in, say, from six to twelve years. Its condition would have a great bearing on the value of that boiler at any one time. The next to that are the flues, and then the condition of the interior of the shell, to determine that corrosion may have taken place or what cracks may have taken place along, for instance, the backhead flange and places of that sort.

Mr.Gray: But in your judgment, a hundred years from now the present 1760 locomotives of the H.& T.C. should be still in service--should be still found in service?

Mr.Oelkers: I cannot pass judgment on that because locomotives in Texas or the United States have not yet lived one hundred years.

It is true that we have railroads of a standard guage, we have tunnels of a certain size, and bridges with certain clearance and capacity, and taking those things into consideration and the general financial condition of railroads, it does not appear that they will ever be capable of changing the gauge and increasing the size of tunnels and bridges so as to make a different style or type of locomotive necessary, which would put all of these others on the back-list; and so far as condition and capability of preserving the condition of locomotives is concerned, they will still be in service a hundred years from now just as today.

Mr.Gray: And you see no occasion for the retirement of locomotives? 1761

Mr.Oelkers: On account of condition, I do not.

Mr.Gray: Whenever an engine is repaired, we will say half of its parts are replaced, would the poor condition of the other half have any tendency toward the destruction of the new parts; will its weakness in one place frequently cause weakness in other places?

Mr.Oelkers: You say whenever an engine is overhauled?

Mr.Gray: Yes.

Mr.Oelkers: Then the other parts that are renewed are not affected by other parts which are not renewed, because those other parts, if not in their proper shape, are repaired so that they are. When an engine is repaired so that half of its parts are renewed it is certainly put in thorough condition in every manner---it would be done by every railroad shop in the United States. Therefore, those parts that are not renewed

are not necessarily in a damaged condition that would affect the other parts that are renewed.

Mr.Gray: Then, in your judgment, every locomotive that comes out of the shop after being repaired is as good as a new locomotive?

Mr.Oelkers: Speaking from a service standpoint, it is.

Mr.Gray: And will go along just as long without any further repairs as a new engine would travel?

Mr.Oelkers: As an absolutely new engine? 1762

Mr.Gray: Yes.

Mr.Oelkers: No. For instance, I will give you an example so you will understand what I mean. For instance, the tires may be half an inch thinner than they would be on a new locomotive; you have not consumed all of the value of those tires, and you would not take those tires off and put a new set on just becuase they have worn down a half inch. So far as service is concerned, that engine is just as good as a new one, but so far as the value of those tires is concerned, at that moment, it is of that much less value--- just the thickness of the tires.

Mr.Gray: Then there is a difference between service and value when you say serviceable?

Mr.Oelkers: When I say condition so far as capability of rendering service is concerned, and condition so far as actual value at the present moment is concerned, then there is a difference.

Mr.Gray: You can bring them up to a state of efficiency without bringing them up to the highest standard of value? 1796

Mr.Oelkers: Yes, sir; because some of the parts may have been part-

ly consumed, but still will be in a perfect state of efficiency.

Mr.Gray: What per cent do you figure that it is safe for a locomotive to drop to?

Mr.Oelkers: Safe? I have never conceived of just an expression on that. Therefore I would say from 55 to 70 per cent, somewhere around in there, would be the lowest value you could acquire by operation of the locomotive, and, of course, they are never operated any longer than they are safe. An engine may be partly dismantled and its value as it stands be considerably less than that.

Mr.Gray: Then its operating efficiency may or may not have anything to do with its value?

Mr.Oelkers: Oh, while it is in operation we know that its value cannot be 30 per cent. Therefore it has some relation.

Mr.Gray: Does economy of operation, meaning thereby economy of 1848
maintenance and fuel performance in proportion to the load haul, have an effect on the policy of retiring old locomotives?

Mr.Oelkers: Economy of operation is often shown on paper by figures that to me are not based on definite enough units to be fully considered. If I say or see that a locomotive has cost a certain amount for maintenance in order to 1849
make a certain mileage and even in order to haul a certain ton mileage, that does not necessarily mean to me that that particular case is a very good performance. If you would tell me, which is very soldom exhibited on performance of an engine, that this engine cost so much for repairs per pound of steam evaporated at a certain pressure or per unit

of actual work done, such as actual foot-pounds delivered, then I would have a better conception of the efficiency of that locomotive, both from-- that is, from an economy of maintenance standpoint. Of course, on the average such figures as exhibited are quire valuable in reflecting the economy of railroad companies' maintenance of equipment or performance and efficiency of the equipment.

Mr.Gray: You don't know what effect it would have then on the policy of retiring old locomotives?

Mr.Oelkers: Pardon me; I don't understand the question.

Mr.Gray: I say you don't know, then, what effect the fuel performance in proportion to load haul would have on the policy of retiring old locomotives, or what effect it does have.

Mr.Oelkers: Oh, yes, I do.

Mr.Gray: Well, what effect does it have--- does it have any effect?

Mr.Oelkers: But I must know actual facts, and preferably of my own observation or the observation of some engineer, to decide whether fuel performance is bad and why that fuel performance is bad. It may be bad on account of the fireman being inadequate-----

Mr.Gray: But it has an effect?

Mr.Oelkers: Or it may be bad on account of the engine not being properly drafted.

Mr.Gray: But I say it does have an effect-- that question has an effect upon the policy of retiring old locomotives?

Mr.Oelkers: No, it has not.

Mr.Gray: Doesn't have any effect?

Mr.Oelkers: It has an effect towards instigating an investigation as to why such a low or high performance exists; that in turn would have an effect as to the condition of that locomotive.

Mr.Gray: And would that have an effect upon the retirement of the locomotive?

Mr.Oelkers: No, it would have an effect as to what repairs or renewals should be made.

Mr.Gray: Well, I suppose you would find it would cost more to renew it than it would to buy a new one, would that have any effect on the retirement of the locomotive?

Mr.Oelkers: If I should find that it would cost more to repair a locomotive than to buy a new one of the same capacity and design, then I would certainly recommend to scrap that locomotive and buy a new one.

Mr.Gray: Would you say that two small engines, each pulling a train of the same size, or a locomotive carrying 130 pounds of steam and using saturated steam, would be as economical 1851 as an engine carrying 200 pounds of steam, equipped with a super-heater?

Mr.Oelkers: No, sir, not at all. However, I wish to say that if I had a certain number of trains to haul, a certain amount of tonnage to handle in one year, and I had two engines or locomotives of the description you have mentioned which I could use for that service, and then had before me the option of investing the required amount of money to buy a large locomotive to do that same work, I couldn't offhand say which would be the more economical plan, because other

factors would be involved. It may be cheaper to retain those two smaller locomotives and do this business with them than to invest in an additional large locomotive and lay the small ones aside, and do the work with that one. It would depend upon the requirements of the railroad company and the existing operating conditions, together with the future operating conditions that would probably be met.

Mr.Gray: What average intervals of time, under ordinary conditions of service, you think would generally intervene between the general shopping of engines?

Mr.Oelkers: General shopping; - I would say about eighteen months, engines in continuous service as near as it is practicable between the shoppings.

Mr.Gray: In what per cent condition would you consider a new engine that had, say, two years operation and was in such shape as it was no longer fit to use in regular train service or even work train service, but was ready for general shopping? 1852

Mr.Oelkers: That would in detail depend on whether any parts of that locomotive had broken, but taking an average of general work on an engine of two years, I would say that the engine had depreciated in value 28 per cent during those two years.

Mr.Gray: That would make it 72 per cent condition if it depreciated 28 per cent during those two years?

Mr.Oelkers: I believe that is very clear, it would have depreciated 28 per cent of its original value.

Mr.Gray: And your theory of depreciation is based entirely upon the cost of repairs that might be made necessary to that engine?

Mr.Oelkers: This is such a simple matter that I don't call it a theory.

Mr.Gray: Well, I say your judgment-- your idea that you present here as to this engine that I have just mentioned, this hypothetical question.

Mr.Oelkers: It would represent the average condition of such a locomotive when it is ready to go into general repairs for the first time after it was a new locomotive. You have given it a good long period of service, two years.

Mr.Gray: Well, I have given it just a deferred maintenance period, rather long, of two years.

Mr.Oelkers: Well, that is a very good selection.

CROSS EXAMINATION OF MR.M.H.HAIG, MECHANICAL ENGINEER OF THE SANTA FE SYSTEM.

Question: Well according to your idea then, if the Santa Fe system once supplied itself with locomotives sufficient for the traffic, that it need never require any more except where there is some accident to the locomotive by reason of a derailment, or destroyed by accident. 1895

Answer: The transportation demands are such that there must be large cars. To haul those large cars you must have large locomotives. Therefore the small locomotive cannot haul those large cars or large trains. Therefore they must be relegated to the rear, but they can be used in service where the work is lighter, and so on down until there is no way which that particular locomotive can be used. When that time comes the locomotive, so far as the railroad is concerned, is useless; but in this matter of

replacements when a locomotive is first considered for design, the matter of this replacement of parts is given as much, often more, attention than any other detail. Preparation is made from the very time that the engine is considered for this matter of replacement and renewal from time to time, and an effort is made to standardize the parts, as you might say, that is to make a casting from one pattern serve as many different locomotives as possible, thereby minimizing the stock which must be carried for those repairs, as that stock is an important item.

__Question__: Well now to get back to my question, once having supplied itself with sufficient locomotives to handle its traffic unless their traffic increased why would you ever 1896 need any new locomotives except to take the place of those which are destroyed by accident?

__Answer__: If the traffic did not increase and cars did not increase they would not have to get any more locomotives.

__Question__: Then the H.& T.C. where the traffic has declined instead of increased in the last ten years would not have any occasion to get any new locomotives.

__Answer__: Well, I know nothing about that road.

__Question:__ We will assume they go on the same plan, that an engine never wears out.

__Answer__: I believe that that statement which I have made would apply generally to those conditions which you mention.

__Question__: What I am asking the witness is whether or not in 1913 his opinion or in the offices of the A.T.& S.F. there has been any conclusion made from the past performance of the

locomotives which have been in their service as to what the performance will be of the locomotives now in service.

Answer: No, sir, and do you want to know why?

Mr.Terry: Yes, state why. You can state why if you want to.

Answer: Because it would be a waste of time to try to make such estimates.

Mr.Terry: Why would it be a waste of time?

Answer: Because we would not gain anything by it, it would not tell us anything.

Question: All right, I will just see whether that will or not--Then you do not introduce the theory of charging for any depreciation on locomotives?

Answer: As I explained this morning from a mechnical and experience standpoint, no, sir.

Question: It would be an unnecessary expense.

Answer: From the standpoint I have mentioned, I consider it so.

Question: It would be an unjust proposition would it not?

Answer: Well, I feel you are getting now in water too deep.

Question: No you don't, you feel like I am about to step on the toes of the people you work for, that is all.

Answer: I think that is wholly an unjust statement. 1914

Mr.Garwood: I think that is a wholly uncalled for remark.

Mr.Terry: Your Honor, he is about to step on the toes of the Interstate Commerce Commission. Now will Mr.Gray step on the toes of the proper people, let him be fair in this matter.

Question: All right-- you do not think that any depreciation is-- properly chargeable to this equipment. If it is kept up, that is, kept in repair.

Answer: The counsel has just explained the requirements of the Interstate Commerce Commission which cannot be overlooked nor do we want to criticise it.

Question: I asked you the question as to whether or not, in your judgment, and your experience, you think there is any depreciation properly chargeable up to locomotives.

Answer: As long as parts are replaced and as long as there is demand which justifies the use of that locomotive, from the conditions I have explained, no, sir.

Question: Any contract that had that provision in it would be unjust and unfair would it not?

Answer: It is not in my province to make contracts.

Question: I am talking about in your judgment as a Mechanical Engineer it would be unjust and unfair would it not, it would be unnecessary?

Answer: I feel I can give more evidence on that class of work which I am required to do.

Question: Thenif the A.T.& S.F. is charging the G.C.& S.F. a certain amount of depreciation upon locomotives which they lease to the G.C.& S.F. that is an unfair and unjust and unwarranted situation? 1915

Answer: That would be entirely beyond my province.

Question: You wouldn't care to express an opinion on it?

Answer: I will answer that by saying that a railroad like any other organization has different men to handle that part of the work and that is not my part of the work and I have no information.

Question: And if the A.T.&.S.F. requires that that locomotive be kept in complete repair and up to the standard that you spoke of, that would be sufficient would it not without charging anything for depreciation?

Answer: I wish you would say that again in a more moderate tone so that I can understand. I did not catch your words very plainly.

Question: I say that if the contract also provides that the G.C.& S.F. should keep that locomotive in complete repair, up to the standard that you spoke of, then certainly there would be no necessity for any depreciation charges being made against it.

Answer: I do not - - -

Question: From an operating standpoint.

Answer: I do not feel that I can competently comment on that.

Question: Then if the Southern Pacific Company was charging the H.& T.C., the G.H.& S.A., the T.& N.O. and other lines 4% depreciation or 3% depreciation and also required that they keep these locomotives up to this standard they would be perpetually in service, that would be an imposition upon the subsidiary would it not? 1916

Mr.Garwood: Your Honor, I certainly object to an A.T.& S.F. mechanic giving judgment upon the business policy of my road. It is only an universal expert or a lawyer such as Mr.Gray can do that.

Mr.Gray: Well I am just simply cracking down on his depreciation or no depreciation, that is all.

Mr. Garwood: Well don't crack down on his.

Mr. Gray: We have to either go north or south, we can't go in both directions. If we are wrong in our ideas of depreciation, the mechanical end is wrong. If the mechanical end is right then the parent line is certainly soaking the subsidiary line on these contracts.

Mr. Garwood: If Mr. Gray wants to back his judgment against all the Master Mechanics in the country of course that is his right as a free-born American citizen, and I do not challenge that. He can do that as long as he wants to do it and it is all right with me. However, I do take exception with any mechanic from the AT&SF or any other line as competent to pass on the business contracts of my roads.

Chairman Mayfield: Do you care to express any opinion on that?

Answer: No, sir, I don't.

Mr. Gray: I urge that this Commission must take one dilemma of the horn or the other. (Laughter) It must either condemn these contracts made by the subsidiary or parent lines or they must recheck this testimony of the mechanical department of some lines. 1917

Mr. Terry: If Mr. Gray will guarantee that the same engines that we have got in use on the GC&SF road will be suitable 25 or 30 years from now then the AT&SF road is wrong in charging us depreciation, but that depreciation is an insurance fund against the future.

Mr. Gray: Certainly it takes care of the obsolescence.

Mr. Terry: Yes, but that obsolescence comes from the machine getting too small.

Mr. Gray: Or from no cause.

Mr. Terry: For instance, suppose we have to electrify all these railroads as is now being done in some of the railroads in the East. Then you have got to throw away all these engines good or bad. That is a mechanical condition that we must look to and it seems to me that as long as Mr. Gray has sat here and heard this case that his mind ought to have taken in that distinction. I am sorry that his mind cannot take in such an item.

DIRECT TESTIMONY OF MR. H. E. BUSHKIRK ON THE VICE-PRESIDENT'S STAFF OF THE MISSOURI, KANSAS & TEXAS RY. CO.

The Chairman: In your judgment is it possible, reasonable and practicable, to conceive an engine to last forever, a locomotive engine? 2052

Mr. Bushkirk: Your Honor, I have watched you with a great deal of interest in your questioning other witnesses on that, and it would really give me supreme pleasure to take you through a locomotive shop, because I believe I can implant in your mind, by a positive, practicable demonstration, the very thing that possesses me as a positive belief, that a locomotive is capable of indefinite service, if it is properly maintained.

The Chairman: That is a theory. Then I am asking you, is it reasonable and practicable to expect it to last forever?

Mr. Bushkirk: Yes, sir. It is my belief. I have never seen a locomotive, as I said, that had been properly maintained, that was not up to its original efficiency, and that can not go on indefinitely.

The Chairman: Don't the time come in the history, in the life of that machine, when it is wise, and the exercise of sound judgment, to displace it, put it aside? Don't some time come? 2053

Mr. Bushkirk: Because of the condition of that particular machine, or of other conditions that influence?

The Chairman: Well, whatever the conditions? Won't conditions arise that will make it wise to do that, to take that course? Won't some sort of conditions arise?

Mr. Bushkirk: Exterior to the locomotive itself, yes. As regards the locomotive itself, positively, no.

The Chairman: Well, every locomotive is retired.

Mr. Bushkirk: Because of the condition of the locomotive?

The Chairman: I am not going to argue with you about conditions, but whatever the conditions may be, some conditions will arise, some sort of condition will arise in the history and the life of that machine, that it will be wise and advantageous to retire it. Whatever those conditions may be now, I do not know.

Mr. Bushkirk: Well, I think there is a line of demarcation there that must of necessity be drawn as between the locomotive in itself and any other condition that may influence the retirement of that locomotive. I agree with you wholly that conditions exterior to that locomotive will arise that will make it advisable to discontinue that locomotive in service. Those are the conditions that I have just endeavored to present-- a change of traffic, a taking advantage of larger units--

The Chairman: Exterior to the machine?

Mr. Bushkirk: Yes, sir, but so far as the machine is concerned, so long as there is service for it, and it is properly maintained,

it will go on and deliver the goods for which it was built and designed.

The Chairman: Well, you can imagine innumerable conditions, but I was just putting it to him whether or not in all reason some condition will arise that will retire it.

Mr. Garwood: For instance, if some new motive power. Locomotives may be flying through the air before young men like Your Honor are dead.

The Chairman: They may. I do not know what conditions are going to arise, but you can only judge the future by the past. They have been retired, and they are retired, and why may we not expect in all good reason that they will be retired in the future?

Mr. Bushkirk: They will unquestionably be retired.

The Chairman: Now, at what period of time? Have you got any idea from your knowledge and experience as to when that period of time elapses when it will be retired?

Mr. Bushkirk: Well, sir, I could not formulate the first--

The Chairman: Are there any statistics or history that you have studied that gives you an idea of the approximate time a locomotive will be retired from the service, either sold to Mr. Kirby or put on the sidetrack and held for future use?

Mr. Bushkirk: No, I would not say that I have knowledge of an average condition of that sort; no, sir, I have never been able to--

The Chairman: Whether it is 29, or 35, or 45, you do not know?

Mr. Bushkirk: No. I know of locomotives that by reason of design were retired in an unreasonably short time, and I know of

At what we can and deliver the goods for which it was built
and designed.

The Chairman: Well, [illegible]

Mr. [illegible]: [illegible]

The Chairman: [illegible]

Mr. [illegible]: They will unquestionably be finished.

The Chairman: [illegible]

Mr. [illegible]: [illegible]

The Chairman: [illegible]

Mr. [illegible]: [illegible]

The Chairman: [illegible]

Mr. [illegible]: [illegible]

locomotives that are today in service, that are over thirty-
five years old, and are performing their service satisfactory,
all that can be expected of a machine of that character 2055
if it were built today, but there is such a broad spread of
that it would be difficult to define it.

CROSS EXAMINATION OF MR. D. W. McLEOD
AUDITOR OF THE GC&SF RY. CO.

Mr. Perkins: I wanted to say, as far as that is concerned, it
doesn't matter what you call the depreciation account or 2367
where you charge it on the books, it doesn't increase the
operating expenses a dollar and has no---

The Chairman: But he says it does.

Mr. Perkins: No, it doesn't increase them a dollar.

The Chairman: Well, he is a bookkeeper, Judge, and an accountant, and a good one.

Mr. Perkins: Yes, but you know as well as I do it doesn't increase them a dollar.

The Chairman: It doesn't because there is none.

Mr. Perkins: No, on the balance sheet it can increase, but there isn't a cent increase, never was and never will be, and you might just as well call it profit and loss or anything else you want to; it has to be put on the books somewhere, if you are going to take any note of it at all, which the railroads didn't use to do, and in which they are right.

Mr. Gray: Mr. Chairman, there is no use of arguments or explanations by counsel. The H&TC and the GH&SA, the two lines we have worked on, pay this depreciation to the parent company;

it goes out of the treasury and they take it out of the man that pays the freight rate, and make a duplicate charge in there; they charge the renewals of their engines, they renew them in their shops, they rebuild them, and they charge a depreciation on both of them; they pay the parent lines for them. I should say they are charged to the freight rate.

Mr. Terry: Your Honor, I think we should have the right to briefly answer this explosion of Mr. Gray's. It is nothing but an 2368 explosion; that's all there is to it.

Mr. Gray: Well, I am tired of counsel from the rear part of the house making an argument into the record.

Mr. Terry: I told Your Honor at Dallas when this thing first came up, that the justification of this charge of depreciation was the liability of the equipment to be retired in future years.

The Chairman: Yes, but your mechanicians say it is never retired.

Mr. Terry: But the record shows it has been retired.

The Chairman: Precisely.

Mr. Terry: The record shows we have retired three or four hundred cars the last year.

The Chairman: Yes, sir.

Mr. Terry: The record shows we have retired numerous engines, because they were too small, not because they were worn out and couldn't be repaired. Now, how long that process is going on, we don't know, and that creates an uncertain element in the valuation of this equipment. If we knew that we are going to use this same equipment forever, there would be no occasion for depreciation, but if we can judge the future by the past a large amount of it is going to be retired in the next twenty-five years, as was done in the past twenty-five years; and that is the justification

of this depreciation charge. I presume that is why the Interstate Commerce Commission allows it, but I don't know their private reasons.

MR. OELKER'S TESTIMONY REGARDING H&TC LOCOMOTIVE NO. 18:

Answer: Engine No. 18, a Schenectady locomotive built in 1890, 1658
25 years old, now in service at Lufkin but requiring repairs.
Her firebox was renewed in 1913 being - February 1913, being
2½ years old. She received general repairs in February 1913
at the time the firebox was renewed, amounting to $5216.00,
and again repairs in November amounting to $1751.00. In
1914 her repairs were very light - in two shoppings $342.00
was spent on the engine. The last inspection of the boiler
shows that the interior of the barrel was in good condition
and that the firebox was in good condition. The lagging was
not removed. That the engine received new driving axles on
the front, main and back wheels in November, 1913. Those are
an important item on a locomotive, because it costs some- 1659
thing to replace them. In 1913 she also received new solid
piston heads, also a new water guage and guage cocks, and
she received a new fire door. The back head braces in the
boiler were renewed at the same time this firebox was renewed
in 1913, it was. The ash pan was renewed, steam pipes renewed;
piston heads were renewed; cross head pins were renewed and
the tender received new draft timbers. Those are some of the
principal renewals. Not listing the other repairs done at
that time, they were all made in 1913.

Chairman Mayfield: What is the condition of that engine now?

Answer: The complete engine depreciation is 22.2 per cent.

Chairman Mayfield: How much did it cost? Have you got that before you?

Answer: Yes, sir, that engine cost $8600.00.

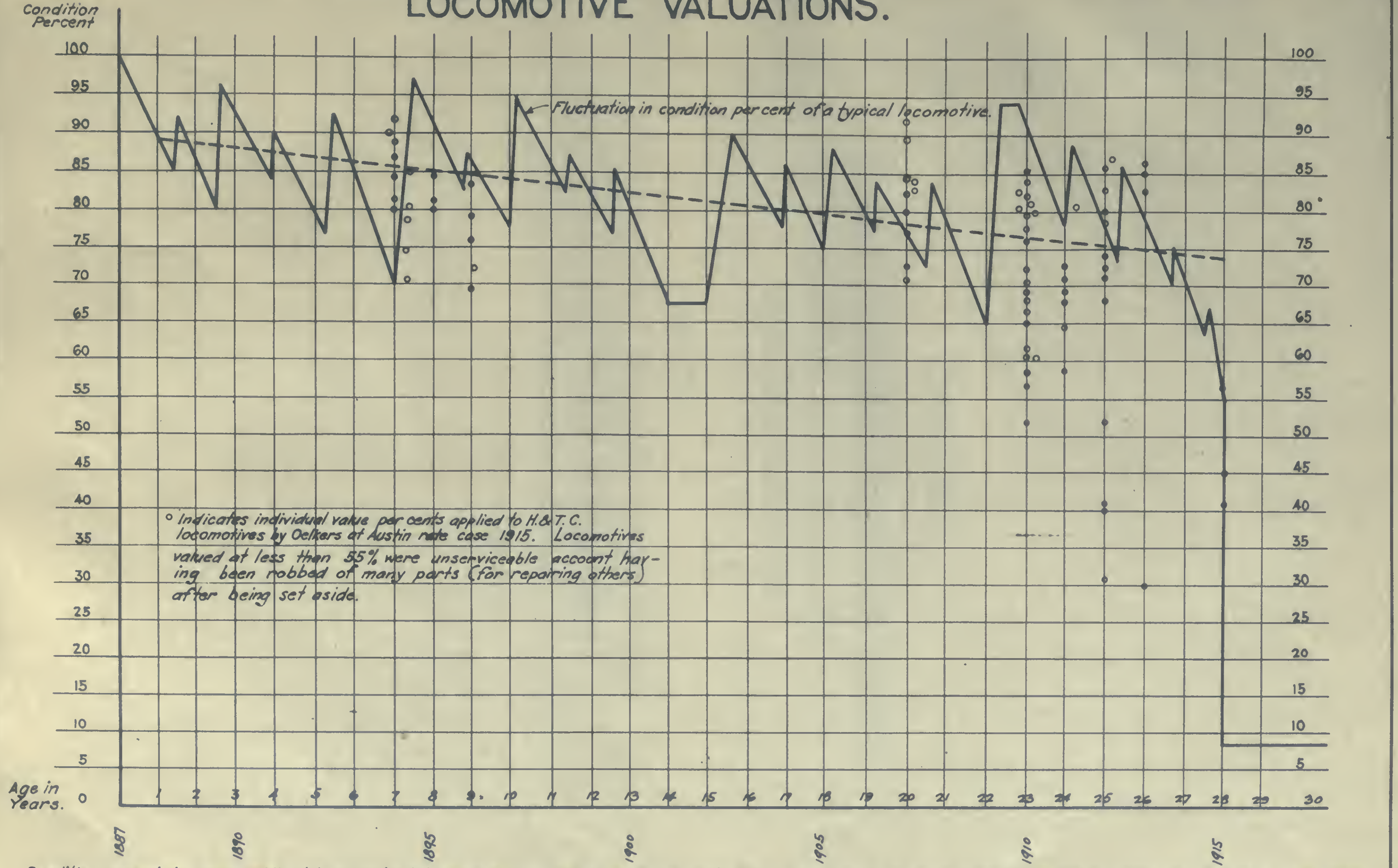
APPENDIX NO. 2

CHART OF LOCOMOTIVE VALUATIONS BASED ON CONDITION PER CENT.

[illegible]

[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]

LOCOMOTIVE VALUATIONS.



○ Indicates individual value per cents applied to H.& T. C. locomotives by Oelkers at Austin rate case 1915. Locomotives valued at less than 55% were unserviceable account having been robbed of many parts (for repairing others) after being set aside.

Condition percent decreases rapidly while locomotive is in service account wear of the various parts. After 12 to 18 months of service somewhat extensive repairs are necessary. When made the condition percent is increased. Should the first repairs be light the increase is small, and the next repairs would be either heavy or general with a relatively greater increase in condition percent. After a period of about 6 or 7 yr's. very heavy repairs would be necessary such as renewal of fire box and other expensive parts and with a correspondingly large increase in condition percent.

In case locomotive is held waiting repairs or as spare after repairs, the condition percent remains constant during such periods.

Note:- Running repairs are excluded because they are too small to be taken into account on a chart of this scale.

APPENDIX NO. 3.

REPORT OF COMMITTEE ON VALUATION OF EQUIPMENT APPOINTED IN CONNECTION WITH TEXAS FREIGHT RATE CASE.

COMMITTEE:

Mr. H. C. Van Buskirk,
Mr. A. P. Prendergast,
Mr. W. J. Miller,
Mr. G. W. McCormick.

Houston, Texas, January 22,1916.

Subject:- Advance in Freight Rates.

Mr. F. G. Pettibone,
V.P.& G.M., G.C.& S.F.Ry.,
Galveston, Texas.

Dear Sir:

Complying with your request of October 24th the committee on valuation of equipment, consisting of Mr.H.C.Van Buskirk, Mr.A.P. Prendergast, Mr.W.J.Miller and the writer met at Houston, Nov.5th.

A lengthy discussion and study was made of the methods of valuation used by the Texas State Commission in recent hearing at Austin, of the methods of valuation used by the Railroads in rebuttal of the values claimed by the State's witnesses, of the methods in use by the Interstate Commerce Commission in their valuation of Railroad properties ,and of the subject in general.

This meeting was followed by a study of equipment conditions and values by subordinate representatives of the above named committee who met at Houston Nov. 19th and 22nd.

The committee's review of the evidence submitted in the Texas Rate Case and of the work now under way by the Interstate Commerce Commission leads to mention the following three paragraphs:

1st. The equipment valuation by the State's witness at recent Texas Rate Case is the total original cost of the equipment less depreciation. The depreciation assigned follows a straight line from the total cost when new to the scrap values when a certain age period, termed expectancy-of-life, has been reached. The life period of each separate class of equipment was assigned according to the probable age at which it would be retired thus:

Locomotives,---varying from 23 to 36 years,
Wooden freight cars--------------- 16 years.
Steel underframe freight cars---- 20 years.
All steel freight cars------------ 25 years.
Wooden underframe tank cars------ 20 years.
Cabooses------------------------- 25 years.
Wooden passenger & postal cars--- 20 years.
Steel underframe passenger and
postal cars---------------------- 25 years.
All steel passenger & postal cars-30 years.
Wooden baggage & express cars---- 25 years.
Steel underframe bagg.& exp.cars- 30 years.

F.G.Pettibone:

A large percentage of the equipment was near, and some had passed the life expectancy assigned as above, and consequently the values as determined by the State's witness was decidedly low.

2nd. The Railroads claimed that equipment which is maintained for service does not actually depreciate in value at a uniform rate from the time it is new until it is retired; that retirements of equipment are not generally made on account of wear and age; that due to renewal of parts and betterments added higher values are maintained than are represented on a straight line of depreciation between the new value and the scrap value at time of retirement. The present, or current value, of equipment claimed by the Railroads was its new value including betterments, less depreciation due to wear or other deterioration lessening its condition. The amount of depreciation assigned was representative of the actual current condition of each piece of equipment and varied in relation to current maintenance.

3rd. The work of valuation of equipment by the Interstate Commerce Commission is now in progress on the St.Louis & Southwestern Ry. The values have not yet been determined, but the methods used are published in a red pamphlet titled: "Instructions for Field Work of the Mechanical and Electrical Sections of the Division of Valuation I.C.C." The instructions outlined therein comprise an elaborate description of each piece of equipment similar to a general specification, an examination of additions and betterments, notes on the condition and defects of the elementary parts and the assignment of a service condition per cent which shall be the weighted average of the condition per cents of the various principal parts. It appears therefore that the values as determined by the Interstate Commerce Commission will be new value including additions and betterments less a depreciation as determined by the condition per cent.

The method used by the Railroads for determining the current depreciated value of their equipment at the Texas Rate Case based the depreciation on condition per cent representing the weighted average condition per cents of the various principal parts and insofar as this detail is concerned was like the method outlined by the Interstate Commerce Commission in the above named Pamphlet. The depreciation under this method is dependent on the condition of the equipment and whatever difference in values may be obtained by its application will be resultant difference of judging or assigning the condition per cent. The undersigned members of this committee are therefore of the opinion that where a current depreciated value of equipment is to be determined the condition per cent of the entire unit shall be used as the value per cent and applied against value new of the entire unit including all of its additions and betterments.

Locomotives while in service are subject to a rapid depreciation due to wear of the various parts. The parts are replaced or repaired periodically and the value of the locomotive is therefore always fluctuating between the value when in first class operating condition and the value when in lowest operating condition. Whenever the lowest operating condition is reached they are given general repairs and the value thereby increased to that represented by first class, or 100% operating, condition. The practices of Railroads in maintenance of locomotives are quite uniform and to some extent necessarily so, account of complying with the I.C.C.Rules on the Inspection and Testing of locomotive boilers, and Rules on the Inspection and Testing of locomotives and tenders. An exhibit sheet has therefore been prepared entitled: "Locomotive Valuations" which illustrates the average value of locomotives at various ages and outlines a proceedure for determining the value of any locomotive as based on a physical condition per cent method as heretofore explained.

Passenger cars are not subject to as much fluctuation in service condition as the locomotives. Their maintenance is dependent on the Railroad's operating demand for the various types of cars. Some wooden cars have been reinforced with steel underframes, steel end construction and in some cases even steel sheathing, while other wooden cars have been retired from service to be substituted by all steel cars. To place a value on passenger train cars the condition and details of construction of each car must be known and the car's equipment, furniture and fixtures, must be duly considered and may require special inventory in cases of business cars, dining cars, special instruction cars, etc. The condition per cent should be determined by taking the proportionate average condition of each the body, underframe, trucks and furniture. The condition must be determined by actual thorough inspection and examination of records of maintenance and records of service. When a series of passenger train cars of the same class and in similar service are found by inspection of a representative number in the series to be of equal condition, the entire series may be assigned the same condition per cent. In all cases where records of original cost are used to determine the "value new" full investigation of additions and betterments must be made and their value added.

Freight cars built previous to 1900 were, as a general rule, built with wooden underframes and bodies. The depreciation on these was rapid as compared with more recently constructed steel underframe cars. Many of the wooden cars have been retired for the reason that they were not of the large capacity as found more economical during the past 15 years, and consequently many were scrapped because they had reached a depreciated condition requiring more money for repairs than was economical to expend in their particular design and capacity of car. Many of the wooden underframe cars, 15 years old and older, are however being rebuilt and steel draft sills, improved draft gears and safety appliances are added so that in their rebuilt state they are of equal, and in many cases of higher value than when originally built.

Mr. F. G. Pettibone:

The depreciation of freight cars due to wear and deterioration is largely dependent on the class of service they are used in and on their merits of design. Their value cannot be determined by any rule, or theory of depreciation, nor can the probable age at retirement be judged by records of previous retirements of freight cars. The values at any time during their existence must be determined by their condition and knowledge or record of the value new including all items of betterments that have been applied. When the value "as new" has been determined, depreciation should be applied in proportion to condition per cent, which shall be assigned as the weighted average condition per cents of the body, underframe and trucks. The conditions per cents shall be determined by inspection and a sufficient number of cars in each like series shall be inspected to furnish a fair basis on assignment of condition per cent to the cars not available for inspection.

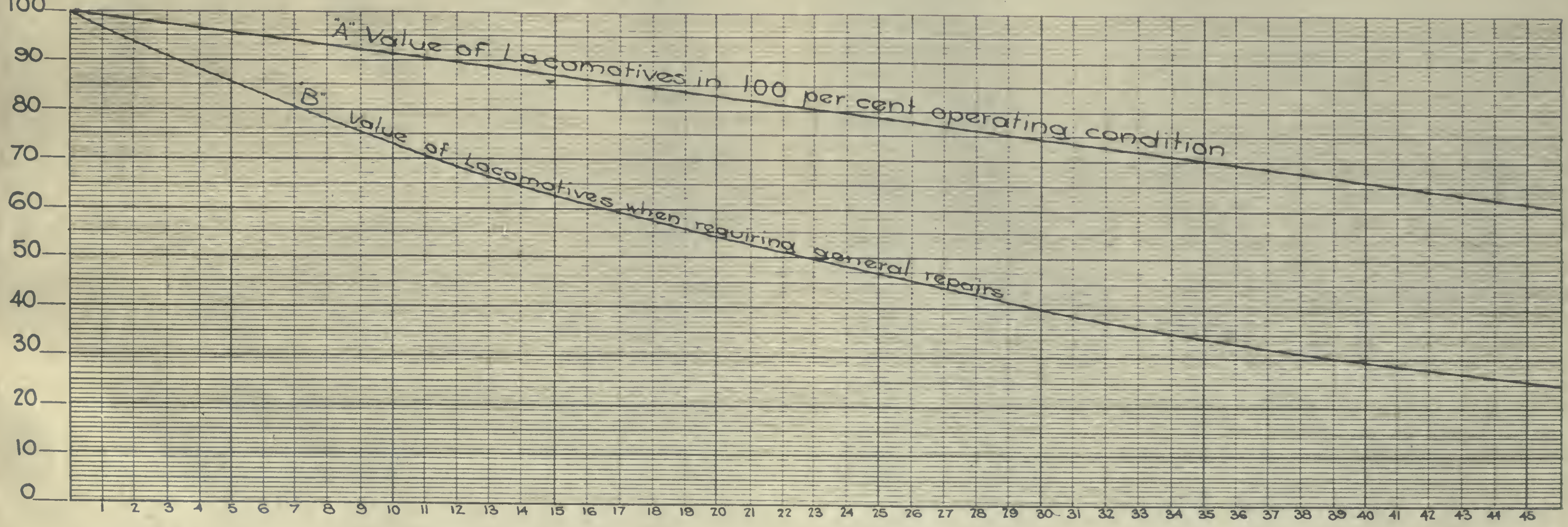
The auditing methods of various Railroads in assigning a rate of depreciation to various classes of equipment as prescribed by the Interstate Commerce Commission in its Classification of Operating Expenses, effective July 1,1914 were also discussed. The rates of depreciation here used are considerably different among the Railroads. We apprehend that the Interstate Commerce Commission will prescribe a specific rate of depreciation for each class of equipment as soon as their valuation of various railway properties has duly progressed.

The above is respectfully submitted by:

G. W. McCORMICK

H. C. VAN BUSKIRK.

LOCOMOTIVE VALUATIONS



To determine value of Locomotives including their Tenders

1. Determine service condition per cent of each individual locomotive, which will be 100 per cent for an engine when turned out of shop after receiving general or other repairs putting it in first class condition or which will be in such proportion to 100 per cent as the remaining serviceable mileage the engine has in proportion to the total mileage performed between shoppings for general repairs.
2. Determine value per cent of each Locomotive from above two curves "A" and "B" by selecting a point on the ordinate corresponding to age of locomotive at such a position between curve "B" and curve "A" as is represented by the locomotive service condition per cent. For instance if the service condition is 50 per cent then the value per cent will be half way between curves "A" and "B"
3. Determine the value of locomotives as if new including all additions and betterments.
4. To ascertain present value multiply the value new by the value per cent as determined under rule 2.
5. In case of a locomotive having been completly rebuilt so that it is written into equipment record at a new date representing the date rebuilt then the age shall be taken as succeeding the date rebuilt with proper allowance in the value per cent to take care of depreciation on such parts as were not renewed.

APPENDIX NO. 4.

AGE OF OLDEST LOCOMOTIVES IN SERVICE AND ESTIMATED AGE OF PRINCIPAL LOCOMOTIVE PARTS.

SOUTHERN PACIFIC COMPANY

Office of Director of Purchases 411.05

New York, August 28, 1916.

Mr. A. D. McDonald:

Referring to our interview on the 25th. As agreed, I wired Messrs. Heintzelman and McCormick as follows:

> "Wire numbers and date placed in service of the six oldest locomotives you have in service or awaiting service."

I have to submit the following:

Pacific System:

CP-1048, Switcher, placed in service July 1866, and CP-1052, Switcher, placed in service August 1867. (These locomotives were originally built by McKay & Ollis, and were converted into switchers about 1895).

CP-1366, 8-wheeler, placed in service April 1868.

CP-1367, 8-wheeler, placed in service October 1872. (This engine built by Southern Pacific Company).

CP-1068, Switcher, placed in service May 1875. (This engine originally a 10-wheeler, and was converted into a switcher).

SP-1305, 8-wheeler, placed in service September 1875.

Sunset-Central Lines:

H. & T. C. 2, Switch, placed in service 1869.

H. & T. C. 300, 10-wheel, placed in service 1875.

M. L. & T. 3, Switch, placed in service 1876.

M. L. & T. 13, Switch, placed in service 1879.

G. H. & S. A. 7, Switch, placed in service 1880.

T. & N. O. 11, Switch, placed in service 1880.

In addition to these they have 25 road and 2 switch engines that were placed in service 1881 and 1882.

F. W. MAHL.

SOUTHERN PACIFIC COMPANY

Office of Director of Purchases

411.05

New York, August 18, 1916.

Mr.A.D.McDonald:

Following my memorandum of August 16th, file 411.05, concerning approximate cost and average life of certain parts of our late Common Standard Consolidation Locomotives. I submit below information I have just received from Mr.Heintzelman:

	Approximate Cost	Average Life
1. Boilers	$3500.00	25 years
2. Fire Box	1500.00	3 "
3. Front Tube Sheet	89.00	10 "
4. Back Tube Sheet	270.00	2-5/6 "
5. Boiler Tubes	609.00	2-1/2 "
6. Cylinders	1272.00	25 "
7. Frames	1475.00	25 "
8. Driving Axles	285.00	7 "
9. Crank Pins	388.00	6 "
10. Piston Rods	13.00	6 "
11. Engine Truck Wheels	54.00	9 "
12. Driving Springs	78.00	1 "
13. Driving Wheel Tires	375.00	4 "
14. Tender Frame	610.00	25 "
15. Tender Tank	1590.00	25 "
16. Tender Trucks	550.00	15 "

Items three to ten inclusive include cost of application, all items cover cost complete per locomotive.

F. W. MAHL.

SOUTHERN PACIFIC COMPANY

Office of Director of Purchases

411.05

New York, August 16, 1916.

Mr.A.D.McDonald:

Referring to my interview on August 14th, with Mr.McCreery in relation to approximate cost and average life, in round figures, of certain parts of locomotives. We did not have this information in the office and I concluded to wire Messrs.Heintzelman and McCormick. I am just in receipt of Mr.McCormick's telegram of August 16th, and submit below the information he has furnished:

	Approximate Cost	Average Life
1. Boilers	$4200.00	25 years
2. Fire Box	1250.00	7 "
3. Front Tube Sheet	96.00	12 "
4. Back Tube Sheet	115.00	5 "
5. Boiler Tubes	935.00	1 "
6. Cylinders	1334.00	20 "
7. Frames	1225.00	25 "
8. Driving Axles	200.00	9 "
9. Crank Pins	104.00	8 "
10. Piston Rods	42.00	5 "
11. Engine Truck Wheels	59.00	4 "
12. Driving Springs	105.00	3 "
13. Driving Wheel Tires	350.00	3 "
14. Tender Frame	670.00	25 "
15. Tender Tank	1650.00	20 "
16. Tender Trucks	1020.00	10 "

Cost figures include labor of applying but exclude cost of removal of old parts.

The type of locomotive selected is our late Common Standard Consolidation Locomotive. The reasons this type of locomotive was selected are as follows:

(1) While the last locomotives of this type built cost in round figures $15,000.00, it would cost approximately $20,000.00 to reproduce them today.

(2) These locomotives have been in service since 1904 and afford us better opportunity of arriving at some reliable data and information.

(3) There are a larger number of this type of locomotive in service than any of our modern types, and I think I am safe in making the assertion that this type of locomotive is called upon to meet more diversified operating conditions than any other type of locomotive.

F. W. MAHL.

Will advise you when I hear from Mr.Heintzelman.

APPENDIX NO. 5.

STATEMENT SHOWING ANNUAL COST TO REPAIR A REPRESENTATIVE NUMBER OF MODERN TYPE LOCOMOTIVES DURING THE PAST TEN YEARS, AND NUMBER OF YEARS IN WHICH ANNUAL COST TO REPAIR EQUALS AVERAGE ORIGINAL COST.

SOUTHERN PACIFIC COMPANY

Statement showing annual cost to repair a representative number of modern type locomotives during the past ten years, and number of years in which annual cost to repair equals average original cost.

Year		Average annual cost to repair.	Average original cost.	Number of years in which cost to repair will equal original cost.
	Switch - 155000 Pounds on Drivers			
	10 locomotives, Nos. 1210 to 1219, both inclusive:			
1913		$349.62	$15,903.23	45.49
1914		1,084.71	15,903.23	14.66
1915		1,632.28	15,903.23	9.74
1916		2,123.48	15,903.23	7.49
	Average 4 years	$1,297.52	$15,903.23	12.26
	Switch - 140000 Pounds on Drivers			
	10 locomotives, Nos. 1138 to 1147, both inclusive:			
1907		$2,066.79	$12,292.22	5.95
1908		1,770.23	12,292.22	6.94
1909		1,986.00	12,292.22	6.19
1910		2,294.24	12,292.22	5.36
1911		2,687.93	12,292.22	4.57
1912		3,528.85	12,292.22	3.48
1913		2,477.00	12,292.22	4.96
1914		2,107.96	12,292.22	5.83
1915		2,000.54	12,292.22	6.14
1916		3,198.25	12,292.22	3.84
	Average 10 years	$2,411.78	$12,292.22	5.10
	Mogul - 147000 Pounds on Drivers			
	10 locomotives, Nos. 1805 to 1807, and 1809 to 1815, inclusive:			
1908		$1,578.04	$16,309.63	10.33
1909		2,419.05	16,309.63	6.74
1910		5,901.70	16,309.63	2.76
1911		2,509.44	16,309.63	6.50
1912		5,549.53	16,309.63	2.94
1913		3,246.98	16,309.63	5.02
1914		3,031.90	16,309.63	5.38
1915		3,806.84	16,309.63	4.28
1916		3,802.80	16,309.63	4.29
	Average 9 years	$3,538.48	$16,309.63	4.61

Year	Average annual cost to repair.	Average original cost.	Number of years in which cost to repair will equal original cost.
Consolidation - 187000 Pounds on Drivers			
(10 locomotives, Nos.2577 to 2586, both inclusive:)			
1907	$3,664.21	$16,160.27	4.41
1908	3,181.48	16,160.27	5.08
1909	3,118.06	16,160.27	5.18
1910	4,369.66	16,160.27	3.70
1911	4,187.51	16,160.27	3.86
1912	4,224.88	16,160.27	3.83
1913	5,395.20	16,160.27	3.00
1914	3,204.90	16,160.27	5.04
1915	4,612.42	16,160.27	3.50
1916	5,275.17	16,160.27	3.06
Average 10 years	$4,123.35	$16,160.27	3.92
8-Wheel - 100000 Pounds on Drivers			
(10 locomotives, Nos.1526 to 1535, both inclusive:)			
1911	$3,895.59	$17,611.94	4.52
1912	6,423.80	17,611.94	2.74
1913	5,586.17	17,611.94	3.15
1914	3,931.05	17,611.94	4.48
1915	4,186.28	17,611.94	4.21
1916	4,037.04	17,611.94	4.36
Average 6 years	$4,676.65	$17,611.94	3.77
10-Wheel - 160000 Pounds on Drivers			
(10 locomotives, Nos.2315 to 2324, both inclusive.)			
1907	$765.77	$18,290.14	23.88
1908	3,335.41	18,290.14	5.48
1909	4,340.99	18,290.14	4.21
1910	4,826.66	18,290.14	3.79
1911	4,830.32	18,290.14	3.79
1912	6,200.30	18,290.14	2.95
1913	5,825.40	18,290.14	3.14
1914	3,344.14	18,290.14	5.47
1915	3,898.57	18,290.14	4.69
1916	5,615.12	18,290.14	3.26
Average 10 years	$4,298.27	$18,290.14	4.26

Year		Average annual cost to repair.	Average original cost.	Number of years in which cost to repair will equal original cost.
	Mikado Passenger - 210000 Pounds on Drivers			
	(10 locomotives, Nos.3236 to 3245, both inclusive:)			
1913		$1,712.98	$26,206.98	15.30
1914		7,448.45	26,206.98	3.52
1915		8,545.72	26,206.98	3.07
1916		7,929.62	26,206.98	3.30
	Average 4 years	$6,409.19	$26,206.98	4.09
	Mikado Freight - 205000 Pounds on Drivers			
	(10 locomotives, Nos.3204 to 3213, both inclusive.)			
1911		$685.71	$23,333.84	34.03
1912		4,210.53	23,333.84	5.54
1913		6,122.59	23,333.84	3.81
1914		4,585.29	23,333.84	5.09
1915		5,355.60	23,333.84	4.36
1916		7,923.47	23,333.84	2.94
	Average 6 years	$4,813.86	$23,333.84	4.84
	Mikado Freight - 206000 Pounds on Drivers			
	(10 locomotives, Nos.3216 to 3225, both inclusive.)			
1913		$689.33	$25,568.37	37.09
1914		3,568.30	25,568.37	7.16
1915		5,822.45	25,568.37	4.39
1916		5,376.47	25,568.37	4.76
	Average 4 years	$3,864.14	$25,568.37	6.62
	Atlantic Type - 105000 Pounds on Drivers			
	(10 locomotives, Nos.3040 to 3049, both inclusive.)			
1907		$6,019.94	$17,447.13	2.90
1908		5,066.68	17,447.13	3.44
1909		5,779.93	17,447.13	3.02
1910		5,762.19	17,447.13	3.02
1911		5,821.18	17,447.13	3.00
1912		6,969.45	17,447.13	2.50
1913		6,737.28	17,447.13	2.59
1914		4,680.59	17,447.13	3.73
1915		4,913.84	17,447.13	3.55
1916		4,587.89	17,447.13	3.80
	Average 10 years	$5,633.90	$17,447.13	3.10

Year		Average annual cost to repair.	Average original cost.	Number of years in which cos to repair will equa original cost.
	Pacific Type - 141000 Pounds on Drivers			
	(10 locomotives, Nos.2410 to 2419, both inclusive)			
1907		$4,886.08	$19,542.56	4.00
1908		4,125.03	19,542.56	4.74
1909		5,431.19	19,542.56	3.60
1910		6,114.73	19,542.56	3.20
1911		6,281.07	19,542.56	3.11
1912		8,135.00	19,542.56	2.40
1913		7,183.53	19,542.56	2.72
1914		6,114.25	19,542.56	3.20
1915		6,169.62	19,542.56	3.17
1916		7,433.12	19,542.56	2.63
	Average 10 years	$6,187.36	$19,542.56	3.16
	Pacific Type - 172000 Pounds on Drivers			
	(6 locomotives, Nos.2453 to 2458, both inclusive)			
1913		$1,497.44	$25,573.28	17.08
1914		5,346.91	25,573.28	4.78
1915		8,011.02	25,573.28	3.19
1916		8,604.57	25,573.28	2.97
	Average 4 years	$5,864.98	$25,573.28	4.36
	Mallet Mogul - 320000 Pounds on Drivers			
	(10 locomotives, Nos.4200 to 4209, both inclusive)			
1911		$554.95	$38,703.13	69.75
1912		5,574.58	38,703.13	6.94
1913		9,804.63	38,703.13	3.95
1914		6,963.53	38,703.13	5.56
1915		6,911.42	38,703.13	5.60
1916		8,333.98	38,708.13	4.64
	Average 6 years	$6,357.18	$38,708.13	6.09
	Mallet Consolidation - 394000 Pounds on Drivers			
	(10 locomotives, Nos.4002 to 4011, both inclusive)			
1910		$3,958.47	$33,199.24	8.39
1911		5,805.60	33,199.24	5.72
1912		5,509.16	33,199.24	6.03
1913		6,985.41	33,199.24	4.75
1914		3,188.92	33,199.24	10.41
1915		4,611.27	33,199.24	7.20
1916		8,048.30	33,199.24	4.13
	Average 7 years	$5,443.88	$33,199.24	6.10

Year		Average annual cost to repair.	Average original cost.	Number of years in which cost to repair will equal original cost.
	Mallet Consolidation - 401000 Pounds on Drivers			
	(10 locomotives, Nos.4029 to 4038, both inclusive)			
1912		$144.73	$39,058.96	269.87
1913		5,899.05	39,058.96	6.62
1914		6,688.06	39,058.96	5.84
1915		6,489.80	39,058.96	6.02
1916		6,983.44	39,058.96	5.59
	Average 5 years	$5,241.01	$39,058.96	7.45
	Grand Average for all types,	$4,624.28	$23,013.73	4.98

APPENDIX NO. 6.

AVERAGE AGE OF VARIOUS TYPES OF LOCOMOTIVES DISMANTLED AT SACRAMENTO SHOPS FROM 1902 TO 1916, INCLUSIVE

AVERAGE AGE OF VARIOUS TYPES OF LOCOMOTIVES DISMANTLED AT SACRAMENTO SHOPS FROM 1902 TO 1916, INCLUSIVE.

No. of Engines		Average Age	
		Years	Mos.
Switch	20	34	0
8-wheel	85	32	5
Mogul	5	30	6
10-wheel	60	29	3
Consolidation	4	20	0
12-wheel	13	20	0
Atlantic	5	13	0
Total	192	29	11

Comments:

From the foregoing it is evident that the old light types of locomotives which can be used on branch lines having light traffic are, by reason of that fact, kept in service for many years longer than newer and heavier types that are fitted only for use where tonnage is heavy and track and bridges are constructed and maintained at a high standard.

The Atlantic type shows an average life of only 13 years, because experience disclosed that the design of these locomotives did not fit the needs of the service.

APPENDIX NO. 7.

EXCERPT FROM DECISION OF SUPREME COURT OF THE UNITED STATES IN THE CASE OF KANSAS CITY SOUTHERN RY.CO. v. THE UNITED STATES OF AMERICA AND THE INTERSTATE COMMERCE COMMISSION.

EXCERPT FROM DECISION OF SUPREME COURT OF THE UNITED STATES IN THE CASE OF KANSAS CITY SOUTHERN RY.CO. v. THE UNITED STATES OF AMERICA AND THE INTERSTATE COMMERCE COMMISSION.

The theory upon which the Commission has acted in formulating its regulations is fairly stated as follows:

The abandonment of property is depreciation, and such depreciation is of two kinds - (1) that which is not replaced in kind, and (2) that which is replaced by improved materials, track or equipment. If a trunk line of road has a branch extending into a territory not served by its main line, and finding the branch unprofitable abandons it, taking up the track without constructing any substitute to serve the same territory, the abandoned branch ceases to be an earning instrumentality. The stockholders can thereafter derive no profit from it. It has served its purpose and only past operations have benefited from it. So far as the profits of past operations have not been distributed to the stockholders, they are represented in the profit and loss account, and therefore such an abandonment or depreciation is properly chargeable to that account, unless a special depreciation account has been established in anticipation of such abandonments; and for such an account, provision is made in the regulations.

The other kind of depreciation is the result of changes attributable to the inadequacy of the existing property to meet the demands of the future. The road or the structures have to be replaced with stronger or more efficient instrumentalities. Abandonments occasioned by changes of this character are therefore chargeable to future earnings, for the reason that the improved condition of the road is not only designed to meet the demands of the future, but presumably will result in economies of operation, and so the re-

sulting benefits will be reaped by those who hold the stock of the company in the present and in the future. The railroad company may, if it sees fit, anticipate general depreciations and make provision for them by establishing a reserve for the purpose, but if no such provision has been made the abandonments should be taken care of by charging them to present or future operating expense. In case, however, the amount is so large that its inclusion in a carrier's operating expenses for a single year would unduly burden the operating expense account for that year, the carrier may, if so authorized by the Commission, distribute the cost throughout a series of years.

[illegible]

By J. R. Commons.

APPENDIX NO. 8.

RESERVES

By J. D. Cowan.

RESERVES

By J. D. Cowan

Generally the term "reserve" is used to indicate something of value set aside for future use. In accounting the term is perhaps used more often to indicate the credit set up in the books as a measure of the assets set aside and as a guard against their use for other than certain specified purposes than to indicate the actual assets set aside. In fact, assets which are reserved are not always set aside, but are often allowed to remain included in the general assets of the company, in which case the credit account established to measure the assets reserved and guard against their misuse is the only record of the reserve which appears in the books. In these comments the term "reserve" is used with reference to this credit account rather than with reference to the reserve assets themselves.

There are two kinds of factors which are constantly working to injure or destroy the invested capital of a business. The first kind operates indirectly through liabilities incurred for material received, services rendered or other value received. Such factors are interest, rent, wages, etc. The capital assets are jeopardized by these factors, since in the ultimate they are responsible for the payment of the liabilities incurred. The second kind operates directly by dissipating the assets or destroying their usefulness. Such factors are wear and tear, decay, accidents, obsolescence, etc.

The liability or loss resulting from these factors must be met either at once or in the future. If the loss must be met at once, the liability therefor is set up in the books without question. If

the loss must be met in the future a liability for the present proportion of that loss, or, in other words, a reserve, should be set up and gradually increased so that at the time the loss must be met the reserve will be sufficient to offset it.

The purpose of creating the reserve is to safeguard the capital assets by insuring, as far as possible, that sufficient surplus assets be retained to offset, at the time incurred, all damage to or loss of capital assets. A secondary purpose is to include in current expenses the proportion of future losses which is chargeable against current earnings. The reserve tends to insure the retention of assets in that it reduces the amount of surplus profits from which dividends may be paid. Current expenses are made to include the present proportion of estimated future losses by the operation of the reserve, since it is created by charging current maintenance and crediting the reserve with the present proportion of such future losses.

The manner of determining the amounts that should be set aside from current earnings to provide against future losses due to values already received differs from the manner of determining the amounts that should be set aside to provide against future losses due to direct dissipation or impairment of assets.

In the first case the losses accrue from day to day and from month to month in accordance with the value received and not paid for. For these losses a reserve should be provided equal to the value received. For instance, if a company borrows $100,000, payable one year after date with interest at 6 per cent., it will have received at the end of the first month the use of $100,000 for one month. The value of that use is one-twelfth of the value of the use for one year or is equal to $500.00. Therefore, at the end of the

month, this company should debit expense and credit accrued interest not due, a reserve account, with $500.00, in order to insure or tend to insure the retention of that amount of assets until the payment is due and to state correctly the month's expenses. Amounts payable for value received are usually the subject of some previous agreement or understanding, and so the proportions chargeable to certain periods prior to the due date are capable of more or less exact determination.

Losses due to direct dissipation or impairment of assets may be realized gradually or suddenly. Factors which result in a gradual loss of assets are wear and tear, decay, etc. Factors which result in an immediate loss of assets are accident, inadequacy, storm, public requirement, etc. Obsolescence may act suddenly, following some new invention which necessitates the immediate discarding of units of plant, or it may act gradually until the advantages derived from the new invention are sufficient to warrant the discarding of the obsolete units. So we may say that losses due to wear and tear do accrue; those due to accident, storm, inadequacy and public requirement do not accrue; and those due to obsolescence may or may not accrue.

The problem of determining the amount of reserve which should be set up to take care of these losses is a rather difficult one. There are two main theories as to the proper method of determination:

1st. The reserve should equal at all times the actual deterioration or accrued depreciation in the assets;

2nd. The reserve should equal at all times that portion of the first cost of the assets (less probable salvage at time of retirement) represented by the ratio of the past life in service to the total probable life in service.

We must bear in mind the fact that a reserve is set up in

order to safeguard the capital investment. If we employ the first theory as the basis of "set-up" we do not provide against factors which result in an immediate total loss-we only provide against factors which result in a gradual loss. Under these conditions losses due to accidents, storms or other factors, which act suddenly, might impair the capital or even necessitate the appointment of a receiver. This method is therefore not safe from a financial point of view. It is also impracticable. The expense of securing careful estimates of accrued depreciation from competent engineers as frequently as would be necessary to keep the reserve at a proper figure would be prohibitive.

A reserve set up in accordance with the second theory would provide against the factors which result in a gradual loss and those that result in an immediate total loss. It would be created by equal charges against earnings at equal intervals, during the life of units of plant, of such amounts that at the end of the useful life of those units the reserve would equal the first cost less salvage. In order to accomplish this result it is necessary to know the length of life of the units now in service. The actual life is not known, of course, but it can be approximated in the light of past experience. From data regarding the length of life of a large number of units of a certain class an average life can be determined which will represent fairly closely the average life in the future of that class of units.

The second theory, then, possesses at least two distinct advantages over the first.

(1) Its acceptance as the basis of the "set-up" results in the cost of the physical assets being spread evenly over the useful life

of those assets. This seems more reasonable than to charge the whole or a major portion of their cost against the earnings of the year in which they go out of service and cease to earn revenue, as would be done in many cases under the first theory.

(2) The reserve resulting therefrom would be adequate to offset all losses sustained through the destruction or retirement of plant from any cause, to the extent that such losses could be intelligently forecast without impairment of the capital assets.

These two advantages of the second theory make it, in my opinion, a more correct theory - certainly a safer one to adopt as a basis of "set-up" for the reserve.

The revenues received during the year in which plant is destroyed by fire or storm are not increased by that loss. They have no more connection with the loss than the revenues of other years. The loss, however, must be made up from revenue. Is it not more correct to take an equal amount from the revenue of all the years during which the plant was in service than to take the whole amount of the loss from the revenues of the year in which the loss occurred? Such losses are as apt to occur in one year as in another, and so each year should contribute toward a reserve from which to meet them.

By using the average life of plant units, determined from past experience, as the basis for setting up the reserve, the probability of losses due to all factors which operated in the past is taken into account and the expenses are made to include the proper proportion of those probable future losses. This method is the insurance method. By means of it the investor's capital is insured (assuming sufficient earnings) against all losses which occur in accordance with past experience. If insurance were taken out against all of these con-

tingencies with independent insurance companies, a certain sum would be paid annually to the insurance companies and included in the expense accounts of the operating company and the insurance companies would accumulate the reserve from which to meet the losses. In case the operating company assumes its own risks and provides reserves to meet the losses, should not the accounting procedure be the same? That is, should not expenses be charged annually with an amount equal to the average annual loss (corresponding with the annual insurance premium which would be paid in the former case) and the reserve account be credited with the same amount, in accordance with the second theory of setting up depreciation reserves previously stated?

Reserves set up in this manner should be carefully checked periodically and, if wide discrepancies are found to exist between the amounts actually charged and the amounts which in determining the set-up it had been assumed would be charged against the reserves, changes should be made in the rate of set-up to prevent the error from being introduced into the reserve. This is necessary since the rate of set-up is based on past experience as to length of life and amount of salvage at the time of retirement, and the actual future experience may differ considerably therefrom. Each class of physical assets should be separately considered over a period if possible equal to or in excess of the average life of that class of assets, and all factors which might affect their life should be taken into account whether or not they had been operative during that period. For the purpose of such a check the books should be kept so that the cost of each class of physical assets and the annual charges against and the balance in the reserve for each class could at any time be readily ascertained.

In the case of public service corporations the point is sometimes made that the public should only pay for plant and improvements of which it receives the benefit. For instance, if a telephone company is ordered to put its wires under ground, the cost of aerial plant which is rendered worthless, it is claimed, should be carried as a deferred charge and amortized over subsequent years. This is not a safe practice for a company to follow, however, as there is no guarantee that future earnings will be sufficient to amortize such loss. Public utilities do not have the power of taxation. They can only take what the public is willing to pay for the service rendered. There is no safety for the investor in the supposition that the public will be willing to make good a loss after it has been realized. If surplus assets were not available for substitution at the time of retirement of capital assets a deficit would be created by such retirement. In this way the investors' security would be reduced and the credit of the company impaired. Public utilities should not only be allowed but should be obliged to provide in advance for all probable losses which might injure the capital in order that the investors (who are a part of the general public) may be protected as far as possible. As brought out subsequently, it may not be advisable for a public utility to charge any expenses, resulting from operation, against surplus or reserves created from surplus; but a sufficient amount of surplus should nevertheless be withheld from distribution among the stockholders to protect the capital invested, although no charges are made directly against it.

Some public utilities not only provide against future capital losses by the establishment of a depreciation reserve, but by in-

creasing the reserve to cover future extraordinary repairs necessitated by storms, floods, fire or other casualties also provide to some extent for future capital requirements and for future operating expenses. The abandonment of plant involved in such extraordinary repairs, so far as it can be foretold, is covered by an ordinary depreciation reserve based on the average life of plant units. Obviously no increase in the reserve should be made to cover such abandonments. Construction of permanent plant, involved in extraordinary repairs, should be charged to construction. It is new plant and should be accounted for as such. The fact that new permanent construction work in connection with extraordinary repairs is done under difficult or rush conditions so that the cost is not comparable with the cost of similar plant constructed under average conditions is not a satisfactory reason for not capitalizing the whole cost. The fixed capital accounts should be charged with the cost of the plant constructed for service regardless of the conditions under which it is constructed. Conditions and prices change from year to year and from day to day, but it is incorrect to charge fixed capital merely with the cost under ideal or average conditions. The fixed capital accounts should show the actual investment of the company's funds in plant and other permanent assets on hand and in service which was made under the conditions prevailing at the time of investment. The practice of charging current expenses with sufficient amounts to build up a reserve to cover the extraordinary portion of the cost of new plant in addition to the cost of the destroyed plant necessitates that current expenses be made to include a portion of future capital expenditures and, therefore, results in a misstatement of both current expenses and fixed capital.

Unusually large items of expense incurred in connection with

extraordinary repairs (such as the cost of temporarily restoring telephone service after a storm) are sometimes provided for in the set-up of the depreciation reserve. These items, although unusually large, are nevertheless chargeable against the period in which they are incurred. They are voluntarily incurred by the company in order to restore service promptly and so forestall criticism and stop loss due to plant out of service. The benefits from the expenditure are received at the time the expenditure is made, and so expense should be charged at that time. It is incorrect in determining net revenue to make deductions for the purpose of providing a reserve for losses or expenses of extraordinary character, which may be experienced in the future but do not affect the current gross revenue nor the plant now in service. Reserves should not be created from current revenue for future loss of profits or unusual expenses (other than future loss or damage to present assets) due to storms, strikes, (e.g., employment of guards and strikebreakers), war (e.g., wages paid employees while in military service) or other calamity. The present net revenue is not affected by such contingencies. Generally speaking they should be cared for from the current revenue of the period in which they are incurred. This can be done without interfering with comparisons of ordinary operating expenses of various periods by the charging of such unusual expenses to a separate account.

Under certain conditions such expenses may properly be charged against surplus (or reserves created from surplus) or equally against the revenues of several successive years, commencing with the year in which incurred.

Public utilities should not charge such expenses against surplus (or reserves created from surplus) for the reason that the rates

which a utility is permitted to charge are to a large extent based on operating costs. If such expenses were charged against surplus (or reserves created from surplus) they might be disregarded in a rate investigation, although they could properly be treated as a part of operating costs. Reserves for such expenses could not properly be created from the operating revenues of previous years since the previous years' operations are in no way associated with such expenses. If subsequent years will receive benefit as a result of such expenses so that a portion might be considered as prepaid or deferred expense, it would be proper to spread the charge over several years commencing with the year in which incurred; otherwise the whole charge should be included in the operating expenses of the year in which incurred. Other classes of industries not subject to public regulation are not under the same obligation to make operating expenses all inclusive and so could properly create a reserve from surplus for such unusual expenses and charge them, when realized, against the reserve.

It seems to be a fair principle to follow that all charges to current expenses should represent expenses currently incurred or should be associated with some benefit currently received. It is proper to make charges to current expenses in order to provide against contingencies so far as they will probably result in future loss of property now in use, since benefits from property now in use are being received currently. Other contingencies, not associated with benefits currently received, should be provided against by withholding a certain amount of profits from distribution among the stockholders of the company either by setting up that amount as a separate reserve account or by allowing that amount to remain in reserve in

the surplus account.

A sound financial policy requires that all future losses be discounted. In order to do this without misstating current net revenues, reserves for future losses, which are in some way associated with current revenue, should be created from current revenue, and reserves for future losses, which are in no way associated with current revenue, should be created from surplus. As previously stated, in the case of public utilities it would probably be inadvisable to charge any expenses or losses associated with operations against reserves created from surplus or directly against surplus. Such a reserve should be maintained, however (either as a separate reserve account or as an undistributed balance in the surplus account), even if no charges be made against it, as it would as far as it is possible insure the retention of surplus assets with which to offset future losses for which no other provision has been made.

APPENDIX NO. 9.

LETTER TO THE CORPORATION TRUST COMPANY, SIGNED BY W. H. OSBORN, COMMISSIONER OF INTERNAL REVENUE, DATED SEPTEMBER 19, 1916.

LETTER TO THE CORPORATION TRUST COMPANY SIGNED BY W.H. OSBORN, COMMISSIONER OF INTERNAL REVENUE, DATED SEPTEMBER 19,1916.

This office is in receipt of your letter of the 30th ultimo, in which you say -

"The Deputy Collector of ______,___ ___, in examining the books of a brewery corporation in connection with the income tax reports submitted for the year 1915, takes exception to the following deductions for repairs to plant, machinery, tools and buildings and accessories, on the ground that such items as gears, pipes, bolts, nuts, valves, etc., replacing worn out parts are not an expense deduction but a charge against previous depreciation.

PUMP AND FILTER-
  Repair parts, replacing gears, rods, etc.,
  Refrigeration, boiling and heating pipe lines.
  Replacing worn out nuts, bolts, lengths of pipe valves.
BOILERS-
  Replacing grate bars.
ELECTRIC-
  Repairs and replacing armatures, rewinding, replacements, for dynamos, generators, etc.
ELEVATORS-
  Repairs and replacing sprocket wheels, chain buckets, etc., on outside elevators.
PIPE COVERINGS-
  Replacements and repairs to worn out pipe covering.
BUILDINGS-
  Asphalt, cement, sand, lumber, iron work, roof covering, pipe used to keep buildings in repair and operation, together with the necessary labor thereon.
  Repairs to the walls, painting, inside elevator gates and repairs, yard pavement, etc.

You refer to Article 131 of Regulations 33 which provides that incidental repairs which neither add to the value of the property nor appreciably prolong its life but keep it in an operating condition, may be deducted as expense, and ask whether or not the corporation is entitled to a further deduction under depreciation for exhaustion,

wear and tear or obsolescence of the property.

In reply you are informed that under the provisions of the Federal income tax law, Section 2, Act of October 3,1913, pursuant to which the return for 1915 was made, corporations are authorized to deduct from gross income a reasonable allowance for depreciation due to use, wear and tear.

Under the rules of this office a reasonable allowance for depreciation must be determined upon the basis of the cost of the property and the probable number of years constituting its life. In other words, the cost of the property for the purpose of arriving at a proper depreciation deduction should be ratably spread over its life. The amount of the allowable depreciation deduction thus ascertained should be credited to a depreciation reserve account, against which account will be charged the cost of renewing or replacing the property with respect to which the depreciation is claimed.

It is not contemplated that such ordinary incidental repairs as keep the property in an operating condition shall be charged to this depreciation reserve but such cost may be charged to the expense of operation and maintenance. In other words, the depreciation deduction authorized by the Act referred to, is intended to provide a fund out of which the loss due to depreciation occasioned by use, wear and tear, may be made good.

This office recognizes the fact that a building or a piece of machinery or other equipment as a whole may deteriorate in value and usefulness by reason of wear and tear, regardless of the fact that certain minor component parts may be renewed, restored or replaced. The depreciation deduction authorized by the law therefore contemplates the creation of a fund that will renew, restore or replace

the original property when it has become worn out or exhausted, regardless of the renewal and restoration of parts that may have been made in the meantime.

Hence it is held that in addition to the depreciation deduction intended to cover the cost of the property as a whole, the expense of incidental repairs which do not add to the value of the property but merely keep it in an operating condition, may be allowably deducted from gross income as an expense of operation and maintenance.

It is barely possible in some instances that worn out parts of a machine or similar equipment may be renewed one after another until the original machine or equipment is swallowed up in the renewed parts and the machine or equipment is then in as good operating condition as it originally was. In this case, if the cost of renewal parts is charged to operating expense, no deduction on account of depreciation should be claimed or allowed as to such machine or equipment.

This would appear to be true in the case of pipe lines, worn out pipe covering and similar articles of equipment. By replacing one joint of pipe after another, all may be replaced, and if the expense is deducted as an operating expense, any depreciation fund that may have been reserved for the purpose of restoring the pipe line as a whole will remain unused.

So that in cases of this kind, if a depreciation reserve is set up to cover property that may be renewed or restored part by part, until the whole is renewed, the cost of the renewed parts should be charged to the depreciation reserve fund and will not be considered incidental expenses within the meaning of the regulations herein-

before referred to.

Incidental repairs, as used in the regulation cited, refers only to those repairs which are, as the term signifies, only incidental to the operation of the property and which will not, if continued as the component parts wear out and are restored make permanent the property.

Hence the depreciation deduction allowable with respect to any property, is such an amount as, in the aggregate, when the property as a whole is worn out, will replace it or return to the corporation the capital invested in it. That is to say, the depreciation deduction allowable under the law and the regulations, should be only such an amount as will take care of loss due to the general wear and tear, and which is to no extent compensated by expenditures made for repairs.

In the case of the brewery company to which you refer, it is the opinion of this office that expenditures for replacing worn out parts such as gears, bolts, nuts, valves, etc., so long as such replacements are not pursued to the extent and for the purpose of finally restoring the machinery or equipment as a whole, constitute incidental repairs within the meaning of Article 131 of Regulations 33, and expenditures of this character are deductible from gross income as an operating expense the depreciation deduction with respect to the property so repaired being reserved to replace the machinery, equipment or building when, as an entirety, it is worn out or is worthless for the purpose for which it is intended.

The depreciation deduction authorized in the Federal income tax law does not contemplate any provision for obsolescence but as

hereinbefore indicated, contemplates the creation of a reserve fund out of which the loss due to use, wear and tear may be compensated.

It is not possible in advance to determine when a piece of machinery, equipment or even a building will become obsolete. In other words, obsolescence cannot be anticipated and an annual deduction to take care of possible obsolescence cannot be allowed.

The rules of this office contemplate that annual deductions for depreciation may be made to provide for loss due to wear and tear, the amount of such deduction to be determined upon the basis of the probable life of the property. If it shall occur that the property becomes obsolete or worthless before its estimated probable life shall have expired, a deduction representing the difference between the cost of the property and the amount previously charged off on account of depreciation may be deducted as a loss, this amount being a deduction due to the obsolescence of the property."

APPENDIX NO. 10.

MEMORANDUM ON DEPRECIATION.

By W. C. Wishart.

MEMORANDUM ON DEPRECIATION

By W. C. Wishart.

A carefully worked out rule for depreciation distributes evenly throughout the years of its life the cost of equipment consumed in the operations of those years.

An ideal depreciation rule would take into account not only retirement but repairs also, to the end that losses which are usually made good by such repairs would be charged against current revenues whether the physical restoration is actually made during the fiscal period or deferred until a later period. When such repairs are not made in a given period, the company would have, nevertheless, proper provision for them in its finances and the net revenues would not be overstated by failing to recognize losses due to wear and tear. It is possible under the new classification of expenses to provide operating reserves for repairs, but in cases where there are balances to be carried over, the rule requires a special report showing the conditions causing the carrying forward of such balances. (See rules 19 and 20, pages 37-38, Classification of Operating Revenues and Operating Expenses, effective July 1st, 1914.) This obligation, and the difficulty of determining average repairs, under present conditions, raises doubt as to the wisdom of creating reserves of this kind.

It is frequently argued that a fixed rate of depreciation tends to limit that flexibility in the accounts which is desirable. A certain flexibility is desirable when it arises out of the amount of work done or comes with changed physical conditions, as for

example, a change in standards. In the absence of operating reserves such flexibility is present. But failure to recognize that the revenues of a given period are earned through the consumption of fixed capital as well as liquid capital, merely results in accumulating charges which must be met eventually. The nearer the actual cost of producing the revenues of a given period can be ascertained, the better position a company has for shaping its course and for demanding revenues which shall be adequate for all of its needs.

APPENDIX NO. 11.

SUGGESTED MODIFICATION IN CLASSIFICATION RULES IN ORDER TO DO AWAY WITH INEQUITABLE RETIREMENT CHARGES TO OPERATING EXPENSES.

Suggested modification in classification rules in order to do away with inequitable retirement charges to operating expenses

If we carefully estimate the average life of each class of equipment, and thereupon determine a depreciation rate based on the aggregate estimated service life of each year's purchase by classes, should we not charge accrued depreciation at the time of each retirement with the entire difference between ledger value and salvage, rather than write off to operating expenses the amount not already accumulated with respect to the individual unit?

To illustrate: Assume 35 cars costing $1,000 each, with an estimated average life of 10 years and salvage $200 each:

> 35 cars 10 years each equals 350 service years, during which operating expenses should be charged $1,000 (cost) less $200 (salvage) for 35 cars, or $28,000, which, divided by 350 years equals $80 per service year.

Year	Depreciation Entries		Retirement Entries		
	Units in service at beginning of year	Charge operating expenses & credit accrued depreciation	Units retired	Service life of units retired	Charge accrued depreciation
1	35	$2,800	1	1	$800
2	34	2,720	0	0	-
3	34	2,720	1	3	800
4	33	2,640	1	4	800
5	32	2,560	1	5	800
6	31	2,480	2	12	1,600
7	29	2,320	2	14	1,600
8	27	2,160	3	24	2,400
9	24	1,920	4	36	3,200
10	20	1,600	5	50	4,000
11	15	1,200	4	44	3,200
12	11	880	3	36	2,400
13	8	640	2	26	1,600
14	6	480	2	28	1,600
15	4	320	1	15	800
16	3	240	1	16	800
17	2	160	1	17	800
18	1	80	0	-	-
19	1	80	1	19	800
	350	$28,000	35	350	$28,000

Under this plan, if our estimate is correct, we shall have an appropriate charge to operating expenses in every year in which we have equipment in service.

On the other hand, if we follow the classification and charge directly to operating expenses the difference between what has already been set up and the service

value for each unit as it is retired, we get the following results:

	Depreciation Entries		Retirement Entries				
Year	Units in service at beginning of year	Charge operating expenses & credit accrued depreciation	Units retired	Service life of units retired (years)	Charge accrued depreciation	Charge operating expenses (retirement accounts)	Total charge to operating expenses
1	35	$2,800	1	1	$ 80	$720	$3,520
2	34	2,720	-	-	-	-	2,720
3	34	2,720	1	3	240	560	3,280
4	33	2,640	1	4	320	480	3,120
5	32	2,560	1	5	400	400	2,960
6	31	2,480	2	12	960	640	3,120
7	29	2,320	2	14	1,120	480	2,800
8	27	2,160	3	24	1,920	480	2,640
9	24	1,920	4	36	2,880	320	2,240
10	20	1,600	5	50	4,000	-	1,600
11	15	-	4	44	3,200	-	-
12	11	-	3	36	2,400	-	-
13	8	-	2	26	1,600	-	-
14	6	-	2	28	1,600	-	-
15	4	-	1	15	800	-	-
16	3	-	1	16	800	-	-
17	2	-	1	17	800	-	-
18	1	-	-	-	-	-	-
19	1	-	1	19	800	-	-
	350	$23,920	35	350	$23,920	$4,080	$28,000

It will be noted that under this plan the entire depreciation will have been written off by the end of the tenth year, although at that time there remain 51 service years yet to utilize out of a total of 350 service years and we have overcharged the ten-year period $4,080, or 17 per cent.

It is assumed in the above illustrations that the actual life of equipment and salvage recovered coincided with the estimate on which the rates were based. While this will not be the case in practice, the variation will not have a disturbing effect, provided the accrued depreciation account for any particular year's purchases of any class of equipmnet be immediately adjusted whenever retirement charges for such equipment shall have exceeded the aggregate depreciation set up to date.

While the foregoing tabulations are based on assumed service lives for the individual units, the results are not less disproportionate in actual practice. This is made evident by corresponding tables based on the history of retirements

of old locomotives on the Union Pacific and Southern Pacific lines during the period from January 1, 1910, to October 31, 1915, as follows:

(SUGGESTED PLAN)

Year	Units in service	Accrued depreciation (credit)	Units retired	Service life of units retired	Accrued depreciation (debit)	Total charge to operating expenses
	Balance	466,000				466,000
21	233	23,300	2	42	6,276	23,300
22	231	23,100	6	132	18,828	23,100
23	225	22,500	5	115	15,690	22,500
24	220	22,000	11	264	34,518	22,000
25	209	20,900	13	325	40,794	20,900
26	196	19,600	11	286	34,518	19,600
27	185	18,500	11	297	34,518	18,500
28	174	17,400	11	308	34,518	17,400
29	163	16,300	11	319	34,518	16,300
30	152	15,200	17	510	53,346	15,200
31	135	13,500	23	713	72,174	13,500
32	112	11,200	25	800	78,450	11,200
33	87	8,700	19	627	59,622	8,700
34	68	6,800	12	408	37,656	6,800
35	56	5,600	9	315	28,242	5,600
36	47	4,700	10	360	31,380	4,700
37	37	3,700	8	296	25,104	3,700
38	29	2,900	4	152	12,552	2,900
39	25	2,500	5	195	15,690	2,500
40	20	2,000	4	160	12,552	2,000
41	16	1,600	3	123	9,414	1,600
42	13	1,300	5	210	15,690	1,300
43	8	800	5	215	15,690	800
44	3	300	-	-	-	300
45	3	300	-	-	-	300
46	3	300	2	92	6,276	300
47	1	100	1	47	3,138	100
Adjustment a/c fraction		54				54
		731,154	233	7,311	731,154	731,154

Average life 31.38

To simplify the figures shown in these tables, it has been assumed that the difference between ledger value and salvage amounted to $3,138 per unit or $731,154 for the 233 units dealt with. On this basis the 7311 aggregate service years averaged $100 each. It has been assumed further that all units were 20 years old at the beginning of the period so that the balance in the accrued depreciation account at that time was 20 x 233 = 466 service years at $100 = $466,000.

(CLASSIFICATION PLAN)

Year	Units in service	Accrued depreciation (Credit)	Units retired	Service life of units retired	Accrued depreciation (Debit)	Operating expenses-retirements	Total charge to operating expenses	Differenc between charge t operatin expenses under th two plan
	Balance	466,000					466,000	
21	233	23,300	2	42	4,200	2,076	25,376	2,076
22	231	23,100	6	132	13,200	5,628	28,728	5,628
23	225	22,500	5	115	11,500	4,190	26,690	4,190
24	220	22,000	11	264	26,400	8,118	30,118	8,118
25	209	20,900	13	325	32,500	8,294	29,194	8,294
26	196	19,600	11	286	28,600	5,918	25,518	5,918
27	185	18,500	11	297	29,700	4,818	23,318	4,818
28	174	17,400	11	308	30,800	3,718	21,118	3,718
29	163	16,300	11	319	31,900	2,618	18,918	2,618
30	152	15,200	17	510	51,000	2,346	17,546	2,346
31	135	13,500	23	713	71,300	874	14,376	874
32	112	4,256	25	800	78,450		4,256	6,944
33	87		19	627	59,622			6,700
34	68		12	408	37,657			5,800
35	56		9	315	28,242			5,600
36	47		10	360	31,380			4,700
37	37		8	296	25,104			3,700
38	29		4	152	12,552			2,900
39	25		5	195	15,690			2,500
40	20		4	160	12,552			2,000
41	16		3	123	9,414			1,600
42	13		5	210	15,690			1,300
43	8		5	215	15,690			800
44	3		-	--	-			300
45	3		-	--	-			300
46	3		2	92	6,276			300
47	1		1	47	3,138			100
		682,556	233	7311	682,556	48,598	731,154	34 (

Under the classification plan, although we have discontinued depreciation charges after the thirty-second year, there remain 684 service years yet to utilize out of a total of 7311, and we have over-charged the twelve year period ended with the thirty-second year $48,598 or 22%.

APPENDIX NO. 12.

EXTRACTS FROM CHAPTER ON DEPRECIATION IN MODERN ACCOUNTING.

By Henry Rand Hatfield, Ph.D.

DEPRECIATION

By Henry Rand Hatfield, Ph.D.

Destruction is the law of nature. Fixed capital, using the term here in its economic rather than in its accounting sense, despite its name, is not exempt from this law. Even so-called permanent improvements, such as buildings, are all subject to the ravages of time, which Marshall aptly defines as "the complex of destructive agencies." All machinery is on an irresistible march to the junk heap, and its progress, while it may be delayed, cannot be prevented by repairs.

This obvious economic fact is of momentous import to accounting, although full recognition has not been given to it in general practice. It is one phase of the question of the inventory discussed in the preceding chapters. It implies that, in valuing all fixed assets, account must be taken of the lapse of time, and even in the case of machinery giving no evidence either of use or misuse, the bare fact that it is a year nearer its inevitable goal is an item of which technical account must be taken.

In estimating the cost of production there must be considered not merely wages and material, interest and rent, repairs and renewals, but in addition some allowance must be made for the diminished value of the fixed assets due to gradual loss of serviceability. Consequently profits are not determined until after allowance has been made for depreciation. Depreciation is not a disposition of part of the profits, but an expense without which profits can never be learned. The principle is clear. Materials consumed in manufacturing a commodity, as for instance fuel or oil,, are, of course, an element of expense. This is so because an item of wealth disappears and its effect can only be to diminish pro tanto the expression indicating

the net wealth. Its loss is in other words an expense. In the case of fuel the loss is immediate, and is, therefore, charged at once to expense. Exactly similar is it with the productive instruments whose use extends over a longer period. The article consumed in a single use must be considered an expense of the current production, the temporary structure or the tools lasting only a year are a charge against the production occurring during that year. The more permanent form of assets serving for productive use during a period of years should be spread as an expense during the period of use, whether that be five or fifty years.

If, instead of considering the year as the fiscal unit of time, the entire economic period of production is regarded as the unit, the purchase of a machine, or the purchase of a patent right are both expenses - expenses to the full amount of the cost. If a manufacturer, renting his plant, produces a thousand engines in a year, it is clear that the annual rental is a part of the expense of producing the thousand engines. But, if the fiscal period is extended, it is equally correct to say that the production of ten thousand engines includes the total payment of rent for ten years. Exactly similar is it with machinery and patent rights. Assuming the life of each to be ten years, the expense of producing ten thousand engines includes not only rental for ten years, but as well the total cost of the machinery used and the cost of the patent rights. A purely artificial division of the productive process into fiscal years is made. It is, therefore, necessary to make an artificial and at best merely approximate division of these total expenses into the shares to be allotted to the operations of the several years.

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In discussing the relative merits of the differing systems of depreciation, it must be borne in mind that allowance for depreciation is only part of a broader scheme whose purpose is to equalize charges between different years. It has been shown that the real cost of manufacturing includes both repairs and depreciation of plant. The total amount paid on both these accounts is properly a charge to the total cost of production during the period that the plant lasts. But the accidental fact that actual payments are not made uniformly is no reason why the annual charge should vary. One does not consider the semi-annual installment of rent or interest as an expense peculiar to the month in which it is paid. Neither should the fact, if it be one, that a machine declines in value more in the first year than in the last year of its life justify making a greater charge to costs in the former year. The complete and scientifically correct method of figuring depreciation compels that there should be at the same time a recognition of the necessity of repairs and a simultaneous apportioning of both repairs and depreciation between the years irrespective of the time when the expense is actually incurred. There should, therefore, be two estimates made, one of the total shrinkage of value during the life of the machine, the other of the total cost of repairs during the same period. This being done there should be an equal apportionment of the sum of these two between the several years. In other words there should be an equal annual charge to expense and a credit to Depreciation account and to Renewal or Repairs Account. Replacement of outworn machines or repairs made can then be charged to these accounts. If the estimates are made with approximate accuracy there will result a distribution

of expense between the several fiscal periods. But where no such uniform annual charge is made to cover repairs, and where expense is annually charged with the repairs actually made, sometimes more and sometimes less, a more correct final showing will be secured by making a sliding charge to depreciation,as is done where it is based on a fixed percentage of the diminishing value. This does not mean that the allocation of depreciation in this manner is in itself more correct,but that this error in apportionment offsets and neutralizes the increasing charges for repairs. But this is at best a rather awkward rule of thumb. The fuller, more scientific treatment of both repairs and depreciation, as being properly a uniform annual charge, is coming more into favor, and is implied in the scheme of accounts promulgated by the Interstate Commerce Commission.

Whatever uncertainty there may be as to the three methods of depreciation already described, there is no doubt as to the illegitimacy of a fourth system that is not infrequently used. This is to make the amount annually written off for depreciation somewhat loosely proportionate to profits. The natural inference from this practice is that in the absence of profits no depreciation is to be reckoned; while the fundamental principle involved is that depreciation is something inexorable, inevitable, an expense to be estimated before it is possible to determine profits. This view is accepted not only by accountants but in Germany at least has been given legal authority by judicial decisions. The correct attitude has been taken in this country, too, by the Interstate Commerce Commission which has adopted as its rule the statement made by P.D.Leake: "One of the most vital matters connected with productive industries and trading concerns is

the regular assessment with substantial accuracy of the annual net profit or loss which has resulted from the operations of each year; and unless a near approximation to the outlay on productive plant which has expired within each year is made and fully provided for out of gross revenue, no correct statement of profit or loss can be obtained. . . . No Profit can exist until Expired Outlay on Productive Plant has been provided out of Gross Revenue."

Present practice is unfortunately not up to this correct principle. Any recognition of depreciation at all being relatively uncommon in the accounts of American corporations, it is not to be wondered at that the few companies which show depreciation in prosperous years, when profits are large, grow faint hearted when business is poor. A few exceptions are to be noted, among which may be mentioned the Allis-Chalmers Company which in 1906 charged nearly $300,000 to depreciation, although that resulted in a total deficit of nearly $400,000.

Depreciation should cover all decline in value due to the use of productive assets. No less than this is required by accounting prudence. But while this standard is frequently not reached, it is not unusual to find corporations charging to depreciation sums far in excess of the actual decline in value. Yet such excessive depreciation offends the very principles of accounting. To charge too much to depreciation is no less a deviation from accuracy than to charge too little. Yet the two transactions are very differently regarded by the public and by the profession. To charge too little is considered dishonorable, to charge more than enough is considered a sign of conservatism and is not only done by the most reputable corporations, but where this occurs the action is very frequently

praised by financial writers.

The effect of excessive depreciation is to conceal the amount of profits, to create what is known as a "Secret Reserve." Depreciation is normally charged to expense, or at least to Profit and Loss. If, in fact, there has been no actual decline in value, the result is that the Balance Sheet shows an understatement of both assets and profits. The questionsinvolved are, therefore, those of undervaluation of Assets and Secret Reserves both of which are elsewhere discussed. Here it suffices to call attention to the fact that an excessive depreciation, while generally condoned, is still a divergence from an ideal accounting, and its effect is the establishment of a Secret Reserve.

The question is frequently raised as to whether depreciation provides for thd replacement of the wasting article. The question itself, although sometimes propounded by accountants, involves a misapprehension. Depreciation in itself merely means that there has been a decline in the value of certain assets. If this results in a net loss evidently there is nothing with which to replace a destroyed asset. For instance, a company with Plant $100,000, Capital $50,000, and Debt $50,000 suffers a depreciation of two per cent. If other expenses just balance income, this means a net loss of $2,000. The Balance Sheet then would read:

Form 42.
Balance Sheet.

Dr.			Cr.	
Plant........	$100,000		Capital............	$50,000
Less depreciation....	2,000	$98,000	Debt...............	50,000
Loss...................		2,000		
		$100,000		$100,000

The plant is the only possession of the company, and there are no other free assets with which the loss can be made good. But

where, after the deduction for depreciation, there is a net profit, the case is different. Assuming that the expenses other than the depreciation were $10,000 and the income $12,001 the balance shows:

Form 43.
Balance Sheet.

Dr.				Cr.
Plant.........	$100,000		Capital................	$50,000
Less depreciation.....	2,000		Debt....................	50,000
		$98,000	Profit and Loss........	1
Other assets..........		2,001		
		$100,001		$100,001

In such a case the depreciation account signifies that other assets are now held equal to the depreciation. Part of the original plant has disappeared, but its value is represented by other assets. Evidently so, for if a decline in the value of one asset has not resulted in a net loss, there must, by the most fundamental principle of double entry bookkeeping, be an equivalent increase in the value of another asset.

The presence of a Depreciation Account signifies, then, the substitution of some new, presumably some floating asset in place of part of the value of one of the fixed assets. Whether this implies the presence of means to replace the old asset, or not, depends on the interpretation of the terms used. If the new asset consists of cash, evidently there are means on hand for replacement; if the assets exist in the form of some new fixed asset, that in itself does not directly give ready money. Constructively there is power to replace because of the equivalence of assets. Practically that power may be hindered by inability to realize on the asset. But a similar difficulty would exist under any circumstances; for the existence of a special replacement fund, composed, say, of stock exchange securities might not always prevent difficulty in raising

funds in a pressing emergency. The existence of a depreciation account implies, except in a Balance Sheet showing a net loss, the presence of new assets, that is of assets acquired since the purchase of the plant, of equivalent value. Whether these new assets furnish means of replacement depends on their nature and the conditions of the general market.

An apparent exception occurs where the new wealth is used to pay off a debt, when the Balance Sheet becomes:

Form 44.
Balance Sheet.

Dr.				Cr.
Plant...........	$100,000		Capital...............	$50,000
Less depreciation,	2,000		Debt..................	48,000
		$98,000	Profit and Loss......	1
Other assets............		1		
		$98,001		$98,001

Here the cancelation, presumably, gives an equivalent borrowing power, and the presence of additional assets or the lessening of debts (that is the cancelation of negative assets) are practically identical.

In addition to the loss from wear and tear even material goods are subject to further depreciation from economic changes. This includes changes in the residual value due to outside conditions, and, if it can be reckoned, the likelihood that the machine will be displaced by new models long before it is worn out. Experience may show that on the average a given class of machinery will be serviceable for twenty years, but that invention is so active that it is more profitable to displace the machines and buy new models as often as once in ten years. This is confessedly vague and indefinite, and implies the ability to calculate the future activities of inventive genius. The process is, of course, constantly taking place. Indeed,

the success of American iron masters has sometimes been attributed to the readiness with which they discard serviceable machines in order to install new inventions. If an airship as now made would certainly run with undiminished mechanical efficiency for thirty years, probably no one would object to the statement that long before that time the present models will be displaced by some new and greatly improved type, and that a calculation to that purport should wisely be made. A more practical illustration is found in the lasts owned by manufacturers of shoes. Materially, these will serve for an indefinite number of years without destruction. Practically, it is a matter of certainty that the present models will be displaced by fashion long before they are worn out, and, as a matter of fact, the accumulated stock of out-of-date lasts is one of the serious burdens of shoe factories. The same principle applies to patterns used in foundries, sets of cards for Jacquard looms, and other assets whose continued serviceability is limited by the dictates of fashion rather than by wear and tear.

Depreciation in all such instances is scarcely to be distinguished from a reserve created to provide against contingencies. If the loss of value is certain enough to be calculable it approximates closely to ordinary depreciation; if less certain and yet not to be neglected it resembles rather a reserve.

The depreciation, or more properly speaking, the amortization of nonmaterial assets is, of course, not due to wear and tear, but is no less inevitable. Where there is a time limit, as, for instance, in the case of a ten years' mining concession, the depreciation must be accomplished within that period. In many cases it is legitimate to charge off the value even more rapidly. Thus a copyright is like-

ly to become of little value before its legal termination. One general rule is here applicable, namely: The more indefinite or uncertain the value of the asset the more rigid and rapid should be its depreciation.

The application of these general principles governing depreciation to the various classes of assets, and the determination of the proper rate to be allowed in each case is a matter of the greatest difficulty. Material goods are subject to depreciation for both physical and economic causes. Physical loss or deterioration is a question whose ultimate decision is in each case to be based on the opinion of technical experts. Only thus can an estimate, even approximating correctness, be made of the probable life of the asset and its residual value. The nature of the machine, the intensity of work, the amount of repairs, the character of the operations, and many other technical matters enter into the calculation for machinery. Equally is each building to be considered by itself, for the nature of its construction, the use to which it is put, the climate to which it is exposed, the expenditures to be made in repairs, and other items are effective in determining its duration. Evidently in so complicated a problem, with so many uncertain, if not unknown quantities, no one even attempts minute accuracy. All the more need for making the calculation as carefully as possible.

It is impossible to lay down specific rates of depreciation which would have any absolute value. The following figures are those given by Dicksee, and indicate roughly the rates which are considered satisfactory where conditions are favorable. In each case the rates are based on the diminishing value.

Asset	Rate of Depreciation
Engines	10 -12½ per cent.
Boilers	12½-20 "
Shafting	5 - 7½ "
General machinery	7½-10 "
Special machinery	10 -25 "
Patterns	25 -33-1/3 "
Horses	15 -25 "

Somewhat similar tables are given by Tiffany, in which greater attention is given to buildings, and in which variations are given to correspond somewhat with details of construction. But it must ever be borne in mind that no general rules can be laid down and each problem must be specifically treated. This doctrine is admirably laid down by the Interstate Commerce Commission which when asked to specify the rates of depreciation to be charged, replied: "Conditions under which equipment is used vary so greatly that no uniform rate of depreciation for all roads could be reasonably determined. The proper rate will, of course, vary inversely with the life of the property to which it pertains, and its determination must take into consideration whatever affects the life of the property. Each reporting officer should determine the rate to be used according to such experience tables as he may be able to construct from equipment records."

APPENDIX NO. 13.

ACCOUNTING FOR REBUILT EQUIPMENT.

[illegible]

[illegible]

ACCOUNTING FOR REBUILT EQUIPMENT

The following provision appears in the Interstate Commerce Commission classification in investment in road and equipment -

> When the cost of the renewals to be made to any unit of equipment will constitute the major portion of its value as renewed, the equipment, when taken out of service, shall be considered as retired and accounted for as provided in the preceding paragraph, and for the purpose of this classification the renewed equipment shall be considered an addition and the appraised cost thereof shall be included in the account appropriate for the cost of the equipment. In no case shall the charge for the renewed equipment exceed the cost (at current market prices of labor and material) of new equipment of similar type, equal capacity, and equal expectation of life in service, less a suitable allowance on account of the second-hand parts remaining therein.

Master Car Builders' rule No.112, paragraph (b), 1916 code, reads:

> A car will be considered as new when written out of service and rebuilt, when the cost of renewals (repairs, renewals or betterments made at the same time) constitutes the major portion of its value as renewed, and settlement will be made as in the case of a new car. In no case shall the charge for the rebuilt car exceed the cost at current market prices for labor and material of new equipment of similar type, equal capacity and equal expectation of life in service, less a suitable allowance on account of the secondhand parts remaining therein.

It will be noted that M.C.B.rule No.112 differs from the classification only by defining "renewals" as "repairs, renewals or betterments made at the same time." Probably the commission intended that the cost of renewals should be understood to include all expenditures made in connection with the work of renewing or rebuilding. Note similarity of definitions of the words "repair" and "renew:"

> Repair: Restoration to a sound or good state after decay, waste, injury or partial destruction; supply of loss; reparation.
>
> Century
> Webster

> Renew: To make new again; restore to former freshness, completeness, or perfection; revive; make fresh or vigorous again; restore to a former state, or to a good state after decay or impairment.
>
> Century

> Renew: To make over as good as new; to restore to former freshness or perfection; to give new life to; to rejuvenate; to restore, to reestablish; to recreate; to rebuild.
>
> Webster.

As a practical matter it is impossible to draw a workable distinction between "repairs" and "renewals." If we renew the boiler of a locomotive, we repair the locomotive. If we renew the firebox, we repair the boiler. If we renew a side-sheet, we repair the firebox. And perhaps it may be said that if we renew a stay-bolt, we repair the side-sheet. And so it goes.

"Big fleas have little fleas
upon their backs to bite 'em,
And little fleas have lesser fleas,
and so ad infinitum."

Apparently in order to make clear the intent of M.C.B.rule 112, the executive committee of the M.C.B.Association issued circular No.13, on October 18,1916, providing therein under the caption "Cars rebuilt" as follows:

> Cars Rebuilt: For the purpose of settling for a destroyed car, a car will be considered as a rebuilt car when the cost of the work (at owner's expense), that is, all labor and all material new to the car, including the usual shop and store expense, constitutes the major portion of its value as renewed. The car, when taken out of service, shall be considered as retired, and the rebuilt car shall be considered as a new car. In no case shall the charge for a rebuilt car exceed the cost, at current market prices of labor and material, of new equipment of similar type, equal capacity and equal expectation of life in service, less suitable allowance on account of the secondhand parts remaining therein.
>
> (a) To determine the value of the car prior to rebuilding, the owner shall take the original cost to date, as shown by his records, and depreciate same at the M.C.B. rates for depreciation from the date originally built new, and the value so determined shall be the appraised value.
>
> (b) The value thus determined, plus the cost of labor, material and shop and store expense for the new service shall be the total value of the new car as of date rebuilt.
>
> (c) No charge to be made for the use of any secondhand material reclaimed from the car to be rebuilt, as the value

of such material is included in the depreciated value of the car which furnished the basic cost for rebuilding.

(d) Where secondhand or scrap material taken from stock is used in the rebuilding of a car, the secondhand or scrap prices should apply.

(e) It being understood that where cars were rebuilt and the accounting was not handled in accordance with the above prior to October 1, 1916, the record value can not now be changed, as the rule is not retroactive.

As for example:

Car built new, June, 1900, cost	$800.00
Car rebuilt, June, 1916	
Depreciation, at 5 per cent. for sixteen years	640.00
Depreciated value	$160.00
Cost of rebuilding, all labor and material new to car	500.00
	$660.00
Less value of material removed and not utilized in construction of the new unit	20.00
Value of car, June, 1916	$640.00

Car to be stenciled, "Built 6-16."

The effect of the M.C.B. rule, as explained in this circular, is to restate the ledger value of equipment whenever the cost of present renewals shall exceed the book value of a car, (i.e., its ledger value less accrued depreciation to date).

Also it is apparently the intention to deal with the new ledger value as the basis for depreciation after date of rebuilding, so that while depreciation at 5% on $800 gave an annual charge of $40 per annum prior to date of rebuilding, the depreciation subsequent to that date would be 5% of $640. or $32 per annum. If this is the intention it is manifestly wrong. The depreciation charge subsequent to rebuilding should be greater than before, if it differs at all.

It is clear that if interline settlement for destruction of another carrier's cars be based on their book values, the lines that

charge a high rate of depreciation and follow a policy of bunching their repair work will restate the ledger value of their equipment most frequently and hence will secure reimbursement on a higher basis than those that follow more rational practices. Hence to obtain substantial justice among roads all should adopt the same rate of depreciation and the same standard of maintenance in order that all shall restate ledger values correspondingly.

Probably because of the impracticability of securing trustworthy appraisals, the M.C.B. rules have heretofore provided for interline settlement for destroyed cars upon the basis of an arbitrarily depreciated value - using a high rate of depreciation for the purpose, with a maximum aggregate depreciation of 60%. Since the variations from correct values that resulted have probably offset themselves through the years as among interchanging carriers, and as the rates of depreciation were high enough to avoid overpaying private car lines, it is quite likely that this plan has proved substantially satisfactory. Certain it is that it will not be improved upon by substituting for it the plan of settling upon the basis of depreciated values as stated in the accounts, for the reason that the purpose of depreciation accounting is to equalize retirement charges among years and not to reflect current values of equipment.

In an endeavor to modify the provisions of both the classification and the M.C.B. rules, in order to bring them into harmony, a special committee of the Association of American Railway Accounting Officers, appointed for conference with the M.C.B.Association, submitted to the president of the A.A.R.A.O. the following:

> At a meeting held February 6th and 8th between the Arbitration Committee of the M.C.B.Association and the

accounting committee appointed for conference with that Association, there were present Mr.C.I.Sturgis, Mr.R.E.Berger, and the undersigned. (Mr. M. P. Blauvelt)

One of the questions which came up for consideration by our Committee was a proper rule to incorporate in the M.C.B. rules defining rebuilt cars and the method of accounting therefor so as to bring the railroad accounting in line with the Interstate Commerce Commission's Rules as prescribed in the Classification of Investment in Road and Equipment of Steam Roads effective July 1st,1914.

After deliberation, it was the unanimous opinion of the members of our Committee present that the M.C.B.Association should include in the proper place in their rules the following as being rules of the Association of American Railway Accounting Officers:

"Fourth: Cars Rebuilt: (a) A car will be considered as a rebuilt car when the owner's records show that at some time previous to its final destruction, the car had been written out of the owner's records and property account, and afterward restored as a rebuilt car, and the accounting for such a car will be as follows:

"When the cost of the renewals (including repairs, renewals, or betterments made at the same time) to be made to any unit of equipment will exceed 50 per cent of the original cost to the carrier of the equipment plus additions and betterments made thereto, it shall be retired and accounted for as provided in the accounting rules of the Interstate Commerce Commission. The rebuilt car shall be considered an addition and the appraised cost thereof shall be included in the account appropriate for the cost of the equipment. The appraised cost shall consist of a fair allowance for salvage used in the rebuilt car which was recovered from the car retired (proper consideration being given to its value as second-hand material), plus the cost of labor and additional material used in rebuilding.

"The owner of the car at the time of rebuilding should prepare and retain in its records during the life of the car a statement showing in detail the value of the salvage used in the rebuilt car which was recovered from the car retired, such statement to be open to the inspection of the company which may be billed for the value of the rebuilt car.

"(b) It should be understood that where cars were rebuilt and the accounting was not handled in accordance with the above, prior to October 1,1916, the record value cannot now be changed, as the rules are not retroactive."

In reaching this conclusion, your Committee felt that the rule at the top of Page 33 of the Interstate Commerce Commission's Classification of Road and Equipment effective July 1st,1914, should be changed in order that accounting uniformity would result and that all roads would be working on the same basis as far as the

> retirement of existing equipment was concerned.
>
> Since the M.C.B.Rules involving this question were effective October 1st,1916, and there are a number of cases under consideration for settlement, the M.C.B. Association made particular request that we take prompt action on this question; and for this reason we informed them that we would ask you to present the matter at the next meeting of the Executive Committee of the Association of American Railway Accounting Officers which we understand is to be held in New York on February 12th.
>
> In this connection, as Chairman of our Committee, I beg to report to you that I think we have made substantial progress in our proposed work with the Master Car Builders' Association and believe that in future all matters involving accounts will be referred by them to our Association or at least taken up for advice before being embodied as part of their rules. For this reason also, your Committee feels that prompt action should be given the matter if the Executive Committee feels it consistent to pass on the question.

To supplement the report of this committee its chairman wrote the president of the Association of American Railway Accounting Officers as follows:

> At a meeting of the Committee appointed by the Association of American Railway Accounting Officers for conference with the Master Car Builders' Association on February 6th and 8th, a question came up involving the definition of what should be considered a rebuilt car.
>
> It was considered by all concerned that the Interstate Commerce Commission' Classification of Investment in Road and Equipment effective July 1st,1914, first sentence on page 33 was so worded as to admit of various different interpretations being placed on the rule; and in order to secure uniformity your Committee was requested to draft a rule to be incorporated as part of the Master Car Builders' Association Rules.
>
> This was done, but in order to clarify the situation, we desire to recommend to the Committee on Corporate, Fiscal and General Accounts that the question of revision of the sentence above referred to in the Interstate Commerce Commission's rules to conform to the following, be taken up:
>
> "When the cost of the renewals (including repairs, renewals, or betterments made at the same time) to be made to any unit of equipment will exceed 50 per cent of the original cost of the equipment, plus additions and betterments made thereto, it shall be retired and accounted for as provided in the preceding paragraph; and for the purpose of this classification the renewed equipment shall be considered an addition and the appraised cost thereof shall be included in the account appropriate for the cost of the equipment. The appraised cost shall consist of a fair allowance for salvage used in the

rebuilt car which was recovered from the car retired (proper consideration being given to its value as secondhand material), plus the cost of labor and additional material expended in rebuilding," etc.,etc.

The president of the association referred these communications to the Committee on Corporate, Fiscal, and General Accounts, which declined to approve the recommendations of the special committee and its chairman, and on April 17, 1917, recommended that the A. A. R. A. O. adopt the following in lieu thereof:

> RESOLVED, That this Association approve the effort of the Special Committee for Conference with the M.C.B.Association to establish uniform rules for settlement between roads for destroyed cars, and believes that where a car has been rebuilt, the settlement should be on the basis of a new car.
>
> FURTHER RESOLVED, That the determination of whether or not a car has been rebuilt should not depend upon the dollars spent but upon schedules of work done which this Association hereby asks the Special Committee to recommend that the Master Car Builders' Association prepare.
>
> FURTHER RESOLVED, That this Association recommend to the Division of Carriers' Accounts, Interstate Commerce Commission, that the existing rule for the retirement of an old unit and the substitution therefor of a rebuilt unit of equipment be amended so that the factor for determining the retirement shall be based upon physical changes reflected by the schedules recommended in the foregoing resolution, rather than upon costs.

While it may be practicable for the M.C.B.Association to presc^r^ibe schedules showing the character of physical changes in accordance with which freight cars shall be considered rebuilt, clearly this will not be practicable in the case of locomotives where the combinations that may fairly be considered to constitute rebuilding are illimitable. Hence, it would seem that the proposal is not feasible. On the other hand, to base the rule on whether or not the amount spent will constitute the major portion of the original cost of the unit would narrow its application almost to the vanishing point. Note from the tables on

pages 126 to 130, inclusive, that during the year 1916 only 1 freight-train car would have been considered rebuilt on the Pacific System if the major portion rule had been based on original cost, as compared with 87 freight-train cars, when based on so-called rebuilt value.

From similar tables prepared for locomotives and passenger-train cars it appears that 11 locomotives and 1 passenger-train car woul have been considered rebuilt if the test were the major portion of original cost, as compared with 95 locomotives and 7 passenger-train cars on the basis of rebuilt value.

No matter on what basis the rule be established it runs at cross purposes to the whole scheme of depreciation accounting and would seem to be better withdrawn entirely from the Commission's accounting rules. A merely cursory study of the history of equipment repairs makes clear its distorting effect. For example, Southern Pacific locomotives 1387, 1389, and 1390, costing $10,600 in 1888, received general over-hauling in 1916 at a cost of $4,480.41, $5,617.89, and $4,357.90, respectively. If we are to consider them rebuilt and add these expenditures to their current book values, we shall find that we have extended their estimated service life 14, 17, and 13 years. As a matter of fact all three of these locomotives will have to have general over-hauling again in about seven years, if they remain in service that long, and then we may find ourselves again adding the cost of the work to their book values - in effect setting the estimated retirement dates ahead faster than we approach them by our depreciation charges.

Certainly such capitalizing of already deferred maintenance charges is indefensible. Our depreciation rates cannot, under the Commission's rules, provide for deterioration that is to be overcome by piecemeal repairs. In the absence of provision for all repairs it is impracticable to anticipate merely such combinations of repairs as fortuitous circumstances may pile into a heap at a particular shopping.

Hence, since the expense of such work cannot be provided for through depreciation charges, it should go directly to operating expenses at the time it is incurred.

The most that can be said in support of the "major portion" rule when based upon rebuilt value is that it may have an effect that will be fortunate from the point of view of the railroad management. It is clear that in the life history of any unit of equipment there will eventually come a time when it has become so far superseded that it will be good business policy to keep it in service only so long as it is in good physical condition. When repairs become necessary their cost must be weighed against the worth of the money if invested in new and more efficient equipment. It does not pay to keep up out of date equipment. However, the operating officer probably has in the past been influenced in favor of maintaining such equipment since to retire it would result in a burdensome charge to his operating expenses, particularly so when as in the case of the Southern Pacific lines a high standard of maintenance has served to minimize the expenditures at each shopping. This will happen even when depreciation accounting is in effect if the depreciation charges are too low. On the other hand if they are too high his tendency might be to retire equipment that had been fully depreciated in the accounts before it has been economically superseded, since by doing so he would avoid further charges for its maintenance. This "major portion" rule that permits of his dealing with such expenditures as increasing the book value of the equipment whenever they are considerable in amount may reduce the influence on his opinion that might otherwise be exerted to prejudice him to decide in favor of premature retirements.

Southern Pacific Company - Pacific System

Effect of adding cost of the work to current depreciated value of freight-train cars shopped for heavy general repairs
Year ended December 31, 1916.
Work costing less than $200 that does not constitute major portion of rebuilt value is omitted.
Northern District.

Number 1	Date built 2	Date shopped 3	As of date shopped					Cost of repairs 9	Cost of additions & betterments 10	Rebuilt value 11	Date turned out of shop 12	As of date turned out of shop		Condition percent increase 15	Increased service life (years) 16
			Original cost 4	Ledger value 5	Accrued depreciation 6	Depreciated value 7	Condition percent 8					Cost 13	Condition percent 14		
23435	10-1912	10-28-15	$ 1,089.44	$1,089.44	$ 130.73	$958.71	88.00	$201.00	--	$1,159.71	1-26-16	$1,089.44	106.45	18.45	--
65174	10-1891	12-12-15	533.68	533.68	426.94	106.74	20.00	120.00	--	226.74	1-15-16	533.68	42.42	22.42	5.60
70972	6-1895	1- 3-16	561.57	561.57	449.26	112.31	20.00	110.00	7.41	229.72	1-22-16	568.98	40.37	20.37	5.09
38581	7-1895	1- 2-16	533.00	533.00	426.40	106.60	20.00	110.00	9.80	226.40	1-29-16	542.80	41.70	21.70	5.42
38607	7-1895	1- 2-16	533.00	533.00	426.40	106.60	20.00	110.00	9.80	226.40	1-15-16	542.80	41.70	21.70	5.42
38698	7-1895	10-29-15	533.00	533.00	426.40	106.60	20.00	120.00	9.80	236.40	1-29-16	542.80	43.55	23.55	5.89
38944	8-1895	12- 8-15	533.00	533.00	426.40	106.60	20.00	110.00	12.53	229.13	1-15-16	545.53	42.02	22.02	5.50
60110	12-1901	1-12-16	818.32	572.83	409.17	163.66	20.00	190.00	13.73	367.39	1-24-16	832.05	44.15	24.15	6.04
64780	3-1889	1- 5-16	521.00	521.00	416.80	104.20	20.00	105.00	10.18	219.38	2-17-16	531.18	41.29	21.29	5.32
65189	11-1891	2- 7-16	520.00	520.00	416.00	104.00	20.00	110.00	--	214.00	2-12-16	520.00	41.15	21.15	5.29
80761	1-1901	2- 6-16	909.00	731.00	545.40	185.60	20.35	190.00	7.41	383.01	2-26-16	916.41	41.81	21.46	5.36
81153	9-1902	12- 8-15	711.41	539.73	369.93	169.80	23.87	170.00	8.64	348.44	2-10-16	720.05	48.39	24.52	6.14
85525	10-1904	1- 7-16	855.65	853.51	282.36	571.15	66.75	191.00	11.74	773.89	2- 3-16	867.39	89.18	22.43	--
38510	6-1895	12-27-15	533.00	533.00	426.40	106.60	20.00	120.00	12.53	239.13	2- 5-16	545.53	43.86	23.86	5.96
38546	6-1895	1- 4-16	533.00	533.00	426.40	106.60	20.00	185.00	7.03	298.63	2-12-16	540.03	55.19	35.19	8.80
38640	7-1895	1- 4-16	533.00	533.00	426.40	106.60	20.00	120.00	--	226.60	2- 8-16	533.00	42.40	22.40	5.60
60263	1-1902	1- 7-16	818.33	572.83	409.16	163.67	20.00	162.00	11.00	336.67	2- 5-16	829.33	40.59	20.59	5.15
62014	12-1913	12-16-15	1,479.94	1,479.94	118.40	1,361.54	92.00	575.00	--	1,936.54	3-25-16	1,479.94	130.85	38.85	--
•61	6-1892	2-16-16	1,438.00	1,438.00	1,150.40	287.60	20.00	380.00	--	667.60	3-25-16	1,438.00	46.43	26.43	6.61
38543	6-1895	2-26-16	540.03	540.03	432.02	108.01	20.00	120.00	--	228.01	3- 2-16	540.03	42.23	22.23	5.56
38616	7-1895	2-23-16	533.00	533.00	426.40	106.60	20.00	110.00	7.03	223.63	3-11-16	540.03	41.30	21.30	5.32
38808	8-1895	3-12-16	539.27	539.27	431.42	107.85	20.00	150.00	9.80	267.65	3-31-16	549.07	48.64	28.64	7.16
38877	8-1895	2-24-16	533.00	533.00	426.40	106.60	20.00	140.00	--	246.60	3-15-16	533.00	46.16	26.16	6.54
60198	9-1892	2-16-16	756.68	756.68	605.34	151.34	20.00	160.00	11.47	322.81	3- 4-16	768.15	41.93	21.93	5.48
52247	6-1902	9- 4-15	1,290.41	967.46	709.38	258.08	20.00	325.00	15.08	598.16	3-29-16	1,305.49	45.81	25.81	6.45
•30	8-1906	3-14-16	1,374.30	1,374.30	494.75	879.55	64.00	260.00	11.06	1,150.61	4- 8-16	1,385.36	83.05	19.05	--
38906	8-1895	3-18-16	533.00	533.00	426.40	106.60	20.00	130.00	--	236.60	4-10-16	533.00	44.39	24.39	6.10
37212	7-1902	4- 4-16	1,198.09	833.37	593.75	239.62	20.00	230.00	--	469.62	4-24-16	1,198.09	39.20	19.20	--
37246	7-1902	4- 7-16	1,198.09	833.37	593.75	239.62	20.00	265.00	--	504.62	4-24-16	1,198.09	42.12	22.12	5.53
64467	10-1901	4-18-16	555.09	534.79	310.85	223.94	40.34	210.00	--	433.94	8-16-16	555.09	78.17	37.83	--
81244	9-1902	4-21-16	711.41	539.73	369.93	169.80	23.87	190.00	--	359.80	5-24-16	711.41	50.58	26.71	6.68
38794	7-1895	4-25-16	533.00	533.00	426.40	106.60	20.00	131.00	--	237.60	5- 3-16	533.00	44.58	24.58	6.14
38824	8-1895	4-25-16	542.80	542.80	434.24	108.56	20.00	140.00	--	248.56	5-13-16	542.80	45.79	25.79	6.45
51274	4-1903	1-17-16	2,112.16	1,583.78	823.74	760.04	35.98	300.00	16.71	1,076.75	5- 4-16	2,128.87	50.58	14.60	--
37061	8-1902	4-27-16	1,198.09	943.41	623.01	320.40	26.74	225.00	--	545.40	5-24-16	1,198.09	45.52	18.78	--
18301	4-1913	5-24-16	1,097.75	1,097.75	131.73	966.02	88.00	275.00	--	1,241.02	6-24-16	1,097.75	113.75	25.75	--
21566	12-1909	4-28-16	1,059.46	1,059.46	254.27	805.24	76.00	226.00	5.62	1,036.86	5-20-16	1,065.08	97.37	21.37	--
81603	4-1903	5- 6-16	1,026.13	875.64	400.19	475.45	46.33	208.00	9.72	693.17	5-27-16	1,035.85	66.92	20.59	--
82399	11-1900	6- 9-16	909.00	909.00	545.40	363.60	40.00	210.00	2.77	576.37	6-27-16	911.77	63.23	23.23	--
84843	10-1904	5- 1-16	871.35	871.35	287.55	583.80	67.00	251.00	17.24	852.04	5-27-16	888.59	95.89	28.89	--
85158	9-1906	5-23-16	1,050.42	1,049.75	283.60	766.15	72.93	208.00	11.12	985.27	6-23-16	1,061.54	92.84	19.91	--
85883	6-1906	4-19-16	1,059.16	862.85	317.75	545.10	51.47	490.00	--	1,035.10	6-16-16	1,059.16	97.72	46.25	--
86115	6-1906	6- 1-16	1,051.52	855.21	315.46	539.75	51.33	400.00	5.62	945.37	6-30-16	1,057.14	89.42	38.09	--
•60	8-1872	4-12-16	1,438.00	1,438.00	1,150.40	287.60	20.00	275.00	13.78	576.38	6-19-16	1,451.78	39.70	19.70	--
38584	7-1895	5-19-16	549.07	549.07	439.26	109.81	20.00	140.00	--	249.81	6- 9-16	549.07	45.50	25.50	6.37
38492	6-1895	1-29-16	533.00	533.00	426.40	106.60	20.00	130.00	7.03	243.63	3- 3-16	540.03	45.00	25.00	6.25

Effect of adding cost of the work to current depreciated value of freight-train cars shopped for heavy general repairs -

Northern District - Sheet 2

Number 1	Date built 2	Date shopped 3	As of date shopped					Cost of repairs 9	Cost of additions & better-ments 10	Rebuilt value 11	Date turned out of shop 12	As of date turned out of shop		Condi-tion percent increase 15	In-creased service life (years) 16
			Original cost 4	Ledger value 5	Accrued depre-ciation 6	Depre-ciated value 7	Condi-tion percent 8					Cost 13	Condi-tion percent 14		
38846	8-1895	5- 6-16	$ 533.00	$ 533.00	$ 426.40	$106.60	20.00	$200.00	--	$206.60	6- 3-16	$533.00	57.52	37.52	9.38
60000	10-1891	5- 7-16	726.00	726.00	580.80	145.20	20.00	145.00	11.00	301.20	6-17-16	737.00	40.87	20.87	5.22
50063	9-1904	5-17-16	1,129.95	856.17	372.88	483.29	42.77	440.00	7.80	931.09	6-30-16	1,137.75	81.83	39.06	--
51291	4-1903	5-17-16	2,110.53	1,582.15	823.11	759.04	35.96	265.00	22.88	1,046.92	6-17-16	2,133.41	49.07	13.11	--
51503	6-1903	5- 4-16	2,110.53	1,582.16	823.11	759.05	35.96	205.00	5.08	969.13	6- 8-16	2,115.61	45.81	9.85	--
51638	6-1903	6- 1-16	2,112.16	1,583.79	823.74	760.05	35.98	435.00	27.65	1,222.70	6-30-16	2,139.81	57.14	21.16	--
37028	7-1902	5-30-16	1,198.09	943.41	623.01	320.40	26.74	238.00	--	558.40	6-27-16	1,198.09	46.61	19.87	--
64932	8-1898	6-13-16	775.00	520.00	365.00	155.00	20.00	165.00	20.36	340.36	8- 5-16	795.36	42.79	22.79	5.69
82020	6-1899	5-20-16	771.00	771.00	493.44	277.56	36.00	222.00	10.18	509.74	7- 1-16	781.18	65.30	29.30	--
38609	7-1895	6-30-16	533.00	533.00	405.08	127.92	24.00	130.00	--	257.92	7-14-16	533.00	48.39	24.39	6.10
38749	7-1895	6-27-16	533.00	533.00	405.08	127.92	24.00	135.00	--	262.92	7-22-16	533.00	49.33	25 33	6.33
38785	8-1895	5-24-16	533.00	533.00	405.08	127.92	24.00	165.00	9.80	302.72	7- 1-16	542.80	55.77	31.77	7.96
38868	8-1895	6-23-16	533.00	533.00	405.08	127.92	24.00	135.00	--	262.92	7-23-16	533.00	49.33	25.33	6.33
38869	8-1895	6-26-16	535.77	535.77	407.19	128.58	24.00	175.00	--	303.58	7-26-16	535.77	56.66	32.66	8.16
37055	8-1902	5- 1-16	1,198.09	943.41	575.08	368.33	30.74	290.00	--	658.33	7-18-16	1,198.09	54.95	24.21	--
37087	8-1902	5-31-16	1,198.09	943.41	575.08	368.33	30.74	260.00	--	628.33	7-29-16	1,198.09	52.44	21.70	--
77347	10-1901	5-30-16	592.23	464.57	307.96	156.61	26.44	162.00	11.53	330.14	7-17-16	603.76	54.68	28.24	7.09
81473	4-1903	8- 1-16	1,032.40	881.91	402.64	479.27	46.42	198.00	5.62	682.89	8-23-16	1,038.02	65.79	19.37	--
85375	10-1904	8-17-16	855.65	853.51	282.36	571.15	66.75	206.00	--	777.15	8-30-16	855.65	90.82	24.07	--
86071	6-1906	7-29-16	1,051.52	855.21	315.46	539.75	51.33	240.00	13.14	792.89	10-14-16	1,064.66	74.47	23.14	--
86311	4-1906	8- 6-16	1,070.21	1,070.21	321.06	749.15	70.00	196.00	13.14	958.29	8-31-16	1,083.35	88.46	18.46	--
38780	7-1895	7- 7-16	542.80	542.80	434.24	108.56	20.00	120.00	--	228.56	8- 6-16	542.80	42.11	22.11	5.53
37045	8-1902	4-19-16	1,198.09	943.41	575.08	368.33	30.74	356.00	--	724.33	12- 7-16	1,198.09	60.46	29.72	--
37049	8-1902	8-18-16	1,198.09	943.41	623.01	320.40	26.74	300.00	80.03	700.43	8-30-16	1,278.12	54.80	28.06	7.08
37059	8-1902	5- 1-16	1,198.09	943.41	575.08	368.33	30.74	240.00	--	608.33	8-26-16	1,198.09	50.77	20.03	--
37211	7-1902	4-19-16	1,198.09	943.41	575.08	368.33	30.74	300.00	80.03	748.36	12- 7-16	1,278.12	58.55	27.81	--
37254	7-1902	8-15-16	1,204.16	839.64	598.81	240.83	20.00	260.00	5.50	506.33	8-29-16	1,209.66	41.86	21.86	5.46
37263	7-1902	5- 1-16	1,198.09	833.37	575.08	258.29	21.56	270.00	--	528.29	8-19-16	1,198.09	44.09	22.53	5.63
37264	7-1902	5- 1-16	1,198.09	833.37	575.08	258.29	21.56	260.00	--	518.29	8-19-16	1,198.09	43.26	21.70	5.42
37271	7-1902	7-28-16	1,198.09	833.37	593.75	239.62	20.00	260.00	--	499.62	8-24-16	1,198.09	41.70	21.70	5.42
61654	6-1911	7-28-16	1,237.32	1,237.32	185.60	1,051.72	85.00	260.00	--	1,311.72	9- 2-16	1,237.32	106.01	21.01	--
21542	12-1909	8-27-16	1,332.10	1,332.10	239.78	1,092.32	81.97	209.00	--	1,301.32	9-23-16	1,332.10	97.68	15.71	--
21682	2-1910	9-13-16	1,332.10	1,332.10	239.78	1,092.32	82.00	244.00	5.62	1,341.94	10- 1-16	1,337.72	100.31	18.31	--
21699	2-1910	9- 1-16	1,332.10	1,332.10	239.78	1,092.32	82.00	223.00	5.62	1,320.94	10-28-16	1,337.72	98.74	16.74	--
80219	5-1899	8-23-16	731.00	731.00	497.08	233.92	32.00	195.00	5.50	434.42	9- 8-16	736.50	58.98	26.98	--
83050	7-1899	8-20-16	737.00	737.00	442.20	294.80	40.00	220.00	--	514.80	9-17-16	737.00	69.85	29.85	--
83334	9-1899	9- 6-16	747.18	747.18	448.31	298.87	40.00	257.00	--	555.87	11- 3-16	747.18	74.40	34.40	--
84508	5-1903	10- 7-16	1,031.92	625.39	402.45	222.94	21.60	202.00	--	424.94	10- 9-16	1,031.92	41.18	19.58	--
84524	5-1903	8-18-16	1,031.92	625.39	402.45	222.94	21.60	259.00	5.62	487.56	10-20-16	1,037.54	46.99	25.39	8.46
86841	7-1907	9- 6-16	1,167.39	1,011.34	280.17	731.17	62.63	210.00	5.62	946.79	9-22-16	1,173.01	80.73	18.10	--
87212	3-1908	8-30-16	1,173.67	1,017.62	281.68	735.94	62.70	210.00	--	945.94	9-28-16	1,173.67	80.60	17.90	--
89490	4-1909	8-16-16	1,078.35	852.52	226.45	626.07	58.06	233.00	5.62	864.69	9-11-16	1,083.97	79.77	21.71	--
•65	5-1899	9- 1-16	1,158.96	1,158.96	788.09	370.87	32.00	450.00	--	820.87	9-28-16	1,158.96	70.83	38.83	9.71
38622	7-1895	8-29-16	533.00	533.00	426.40	106.60	20.00	130.00	--	236.60	9-28-16	533.00	44.39	24.39	6.10
38715	7-1895	8-24-16	533.00	533.00	426.40	106.60	20.00	155.00	9.80	271.40	9-18-16	542.80	50.00	30.00	7.50
38927	8-1895	6-21-16	533.00	533.00	405.08	127.92	24.00	155.00	--	282.92	7-14-16	533.00	53.08	29.08	7.27
38988	9-1895	6-21-16	533.00	533.00	405.08	127.92	24.00	140.00	--	267.92	7- 8-16	533.00	50.27	26.27	6.57

Effect of adding cost of the work to current depreciated value of freight-train cars shopped for heavy general repairs -

Northern District - Sheet 3

Number 1	Date built 2	Date shopped 3	As of date shopped					Cost of repairs 9	Cost of additions & betterments 10	Rebuilt value 11	Date turned out of shop 12	As of date turned out of shop		Condition percent increase 15	Increased service life (years) 16
			Original cost 4	Ledger value 5	Accrued depreciation 6	Depreciated value 7	Condition percent 8					Cost 13	Condition percent 14		
38914	8-1895	9-11-16	$ 533.00	$ 533.00	$ 426.40	$106.60	20.00	$140.00	--	$ 246.60	9-24-16	$533.00	46.27	26.27	6.57
52430	8-1901	8-13-16	609.04	425.85	304.04	121.81	20.00	160.00	--	281.81	9-24-16	609.04	46.27	26.27	6.57
37019	7-1902	8-18-16	1,198.09	943.41	623.01	320.40	26.74	315.00	--	635.40	9- 2-16	1,198.09	53.03	26.29	--
37025	7-1902	9- 1-16	1,198.09	943.41	623.01	320.40	26.74	280.00	--	600.40	9-21-16	1,198.09	50.11	23.37	--
37037	7-1902	9- 6-16	1,198.09	943.41	623.01	320.40	26.74	305.00	--	625.40	9-26-16	1,198.09	52.20	25.46	--
37044	8-1902	9- 5-16	1,198.09	943.41	623.01	320.40	26.74	280.00	--	600.40	9-28-16	1,198.09	50.11	23.37	--
37056	8-1902	8-25-16	1,198.09	943.41	623.01	320.40	26.74	220.00	--	540.40	9-13-16	1,198.09	45.10	18.36	--
37065	8-1902	9- 6-16	1,198.09	943.41	623.01	320.40	26.74	275.00	--	595.40	9-28-16	1,198.09	49.70	22.96	--
37078	8-1902	9- 1-16	1,198.09	943.41	623.01	320.40	26.74	240.00	--	560.40	9-20-16	1,198.09	46.77	20.03	--
37224	7-1902	8-23-16	1,198.09	833.37	593.75	239.62	20.00	335.00	--	574.62	9-23-16	833.37	68.95	48.95	12.24
37226	7-1902	8-24-16	1,198.09	833.37	593.75	239.62	20.00	267.00	--	506.62	9-17-16	833.37	60.79	40.79	10.20
77184	10-1901	8-13-16	585.96	458.30	328.14	130.16	22.21	140.00	--	270.16	9- 9-16	585.96	46.11	23.90	5.97
61861	11-1913	6- 3-16	1,479.93	1,479.93	44.40	1,435.53	97.00	520.00	--	1,955.53	10-26-16	1,479.93	132.14	35.14	--
17319	2-1910	9-23-16	1,046.30	1,046.30	156.95	889.35	85.00	207.00	--	1,096.35	10- 9-16	1,046.30	104.78	19.78	--
20655	11-1909	10-21-16	1,054.25	883.95	189.77	694.18	65.85	262.00	5.62	961.80	12-18-16	1,059.87	90.76	24.91	--
21092	11-1909	10-12-16	1,332.10	1 332.10	239.78	1,092.32	82.00	230.00	--	1,322.32	11-28-16	1,332.10	99.27	17.27	--
21204	12-1909	10-11-16	1,332.10	1,332.10	239.78	1,092.32	82.00	232.00	5.50	1,329.82	11-18-16	1,337.60	99.43	17.43	--
83387	9-1899	9-28-16	737.00	737.00	442.20	294.80	40.00	210.00	15.68	520.48	10-24-16	752.68	69.15	29.15	--
84598	6-1903	9- 5-16	1,031.92	625.39	402.45	222.94	21.60	195.00	5.50	423.44	10-28-16	1,037.42	40.82	19.22	--
84905	10-1904	10-11-16	871.36	871.36	287.55	583.81	67.00	259.00	5.62	848.43	11-30-16	876.98	96.76	29.76	--
88579	2-1909	9- 5-16	1,073.23	1,073.23	225.38	847.85	79.00	210.00	--	1,057.85	9-28-16	1,073.23	98.57	19.57	--
38908	8-1895	10- 3-16	533.00	533.00	426.40	106.60	20.00	120.00	--	226.60	10-21-16	533.00	42.51	22.51	5.63
37026	7-1902	9-21-16	1,265.27	1,010.59	657.94	352.65	27.87	210.00	--	562.65	10- 7-16	1,265.27	44.47	16.60	--
37039	7-1902	8-29-16	1,198.09	943.41	623.01	320.40	26.74	450.00	--	770.40	10-15-16	1,198.09	64.30	37.56	9.39
37081	8-1902	9-14-16	1,198.09	943.41	623.01	320.40	26.74	300.00	--	620.40	10- 3-16	1,198.09	51.78	25.04	--
37223	7-1902	9-15-16	1,198.09	833.37	593.75	239.62	20.00	295.00	--	534.62	10- 6-16	1,198.09	44.62	24.62	6.15
37229	7-1902	8-29-16	1,198.09	833.37	593.75	239.62	20.00	350.00	--	589.62	10-21-16	1,198.09	49.21	29.21	7.30
37240	7-1902	9- 5-16	1,198.09	833.37	593.75	239.62	20.00	260.00	--	499.62	10- 7-16	1,198.09	41.70	21.70	5.42
37243	7-1902	10-10-16	1,198.09	833.37	593.75	239.62	20.00	255.00	5.50	500.12	10-27-16	1,203.59	41.56	21.56	5.39
37266	7-1902	9-24-16	1,198.09	833.37	593.75	239.62	20.00	315.00	--	554.62	10-24-16	1,198.09	46.29	26.29	6.57
37278	7-1902	9-21-16	1,198.09	833.37	593 75	239.62	20.00	230.00	--	469.62	10-12-16	1,198.09	39.19	19.19	--
37280	7-1902	8-29-16	1,198.09	833.37	593.75	239.62	20.00	320.00	--	559.62	10- 5-16	1,198.09	46.69	26.69	6.67
16661	12-1909	10-24-16	1,046.31	1,046.31	188.34	857 97	82.00	270.00	11.12	1,139.09	12- 7-16	1,057.43	107.75	25.75	--
21569	12-1909	11- 1-16	1,332.10	1,332.10	239.78	1,092.32	82.00	245.00	5.62	1,342.94	12-13-16	1,337.72	100.40	18.40	--
61035	4-1894	9- 7-16	611.34	611.34	489.07	122.27	20.00	130.00	--	252.27	11-25-16	611.34	41.27	21.27	5.32
61116	9-1898	10-25-16	521.00	521.00	354.28	166.72	32.00	170.00	--	336.72	11-11-16	521.00	64.63	32.63	8.16
85133	9-1906	10-25-16	1,050.42	1,049.75	283.61	766.14	72.93	258.00	7.64	1,031.78	12- 7-16	1,058.06	97.54	24.61	--
86653	7-1907	10-18-16	1,167.39	1,011.34	280.17	731.17	62.63	247.00	7.64	985.81	12-17-16	1,175.03	83.92	21.29	--
87206	4-1908	10-26-16	1,167.40	1,011.35	280.18	731.17	62.63	241.00	13.14	985.31	12-22-16	1,180.54	83.46	20.83	--
88939	8-1907	10-24-16	1,162.26	1,118.83	278.94	839.89	72.26	275.00	7.64	1,122.53	12- 7-16	1,169.90	95.97	23.71	--
38551	6-1895	10-28-16	533.00	533.00	426.40	106.60	20.00	165.00	2.77	274.37	11-18-16	535.77	51.20	31.20	--
51847	7-1901	10-19-16	862.62	862.62	483.07	379.55	44.00	180.00	75.00	634.55	11-23-16	937.62	67.68	23.68	--
77141	9-1901	9-26-16	592.23	464.57	331.65	132.92	22.44	140.00	--	272.92	10-10-16	592.23	46.08	23.64	5.91

Effect of adding cost of the work to current depreciated value of freight-train cars shopped for heavy general repairs -

Northern District - Sheet 4

			As of date shopped									As of date turned out of shop			
Number 1	Date built 2	Date shopped 3	Original cost 4	Ledger value 5	Accrued depre-ciation 6	Depre-ciated value 7	Condi-tion percent 8	Cost of repairs 9	Cost of additions & better-ments 10	Rebuilt value 11	Date turned out of shop 12	Cost 13	Condi-tion percent 14	Condi-tion percent increase 15	In-creased service life (yrs). 16
86769	7-1907	11- 3-16	1,167.39	1,011.34	280.17	731.17	62.63	238.00	17.24	986.41	12-23-16	1,184.63	85.27	20.64	--
52347	2-1906	9-28-16	$ 716.08	$ 670.00	$ 286.43	$ 383.57	53.56	$180.00	$71.00	$ 634.57	11-23-16	$ 787.08	80.62	27.06	--
37038	7-1902	10-24-16	1,198.09	943.41	623.01	320.40	26.74	315.00	--	635.40	11-14-16	1,198.09	53.03	26.29	--
37057	8-1902	10-20-16	1,198.09	943.41	623.01	320.40	26.74	305.00	--	625.40	11-25-16	1,198.09	52.20	25.46	--
37062	8-1902	10-10-16	1,198.09	943.41	623.01	320.40	26.74	310.00	--	630.40	11-22-16	1,198.09	52.62	25.88	--
37063	8-1902	10- 2-16	1,198.09	943.41	623.01	320.40	26.74	300.00	--	620.40	11-10-16	1,198.09	51.78	25.04	--
37064	8-1902	10-20-16	1,265.27	1,010.59	657.94	352.65	27.87	285.00	--	637.65	11-14-16	1,265.27	50.40	22.53	--
37069	8-1902	8-29-16	1,198.09	943.41	623.01	320.40	26.74	570.00	--	890.40	11-18-16	1,198.09	74.32	47.58	11.89
37088	8-1902	10-30-16	1,198.09	943.41	623.01	320.40	26.74	280.00	--	600.40	11- 9-16	1,198.09	50.11	23.37	--
37091	8-1902	8-29-16	1,198.09	943.41	623.01	320.40	26.74	450.00	--	770.40	11-18-16	1,198.09	64.30	37.56	9.39
37225	7-1902	10-17-16	1,198.09	833.37	593.75	239.62	20.00	275.00	--	514.62	11-13-16	1,198.09	42.95	22.95	5.74
37245	7-1902	8-29-16	1,198.09	833.37	593.75	239.62	20.00	585.00	--	824.62	11-18-16	1,198.09	68.84	48.84	12.21
37262	7-1902	8-23-16	1,198.09	833.37	593.75	239.62	20.00	580.00	--	819.62	11-15-16	1,198.09	68.42	48.42	12.10
37272	7-1902	8-29-16	1,198.09	833.37	593.75	239.62	20.00	560.00	--	799.62	11-18-16	1,198.09	66.75	46.75	11.69
17244	1-1910	10-21-16	1,046.31	1,046.31	188.34	857.97	82.00	255.00	15.22	1,128.19	12-27-16	1,061.53	106.28	24.28	--
20606	11-1909	11-13-16	1,054.47	915.73	253.07	662.66	62.84	248.00	11.12	921.78	12-22-16	1,065.59	86.55	23.71	--
65107	4-1894	12-18-16	611.34	611.34	489.07	122.27	20.00	140.00	--	262.27	12-23-16	611.34	42.90	22.90	--
65158	10-1891	11-20-16	520.00	520.00	416.00	104.00	20.00	175.00	2.77	281.77	12-20-16	522.77	53.90	33.90	--
38776	7-1895	11-24-16	533.00	533.00	426.40	106.60	20.00	115.00	--	221.60	12-14-16	533.00	41.58	21.58	5.39
38911	8-1895	11-21-16	533.00	533.00	426.40	106.60	20.00	120.00	--	226.60	12- 2-16	533.00	42.52	22.52	5.63
38986	9-1895	11-21-16	533.00	533.00	426.40	106.60	20.00	165.00	--	271.60	12-30-16	533.00	50.96	30.96	7.74
51812	6-1901	11-21-16	866.62	866.62	519.97	346.65	40.00	260.00	--	606.65	12-13-16	866.62	70.00	30.00	--
55761	6-1901	11-21-16	862.62	862.62	517.57	345.05	40.00	240.00	--	585.05	12-13-16	862.62	67.82	27.82	--
37020	7-1902	8-30-16	1,198.09	943.41	623.01	320.40	26.74	560.00	--	880.40	12-31-16	1,198.09	73.48	46.74	11.68
37029	7-1902	8-29-16	1,198.09	943.41	623.01	320.40	26.74	550.00	--	870.40	12-10-16	1,198.09	72.65	45.91	11.48
37050	8-1902	8-29-16	1,198.09	943.41	623.01	320.40	26.74	540.00	--	860.40	12-10-16	1,198.09	71.81	45.07	11.27
37073	8-1902	10-17-16	1,198.09	943.41	623.01	320.40	26.74	305.00	--	625.40	12- 7-16	1,198.09	52.20	25.46	--
37237	7-1902	11- 3-16	1,198.09	833.37	593.75	239.62	20.00	290.00	--	529.62	12- 7-16	1,198.09	44.21	24.21	6.05
37275	7-1902	11-10-16	1,198.09	833.37	593.75	239.62	20.00	335.00	--	574.62	12-14-16	1,198.09	47.96	27.96	6.99
83913	10-1902	11-14-16	784.91	613.90	408.15	205.75	26.21	130.00	77.89	413.64	12- 9-16	862.80	47.94	21.72	--
							Southern District								
•373	5-1897	7-28-15	1,166.13	1,166.13	886.26	279.87	23.93	225.00	--	504.87	3-19-16	1,166.13	43.22	19.29	--
•403	12-1902	12-29-15	763.80	763.80	397.18	366.62	48.00	233.00	--	599.62	1-28-16	763.80	78.57	30.57	--
•288	8-1895	1-20-16	1,045.81	1,045.81	836.65	209.16	20.00	207.00	--	416.16	2-14-16	1,045.81	39.76	19.76	--
•331	6-1902	1-24-16	1,098.49	1,098.49	615.15	483.34	43.98	327.00	28.17	838.51	3- 9-16	1,126.66	74.42	30.44	--
•283	11-1907	7-17-16	1,620.51	1,620.51	583.38	1,037.13	64.01	255.00	50.88	1,343.01	8- 7-16	1,671.39	80.37	16.36	--
•327	9-1906	7-24-16	1,374.30	1,374.30	549.72	824.58	60.00	238.00	11.06	1,073.64	8-12-16	1,385.36	77.49	17.49	--
85318	10-1904	9-17-16	855.65	853.51	410.71	442.80	51.75	341.00	--	783.80	10-14-16	855.65	91.60	39.85	--
•59	12-1900	8-16-16	1,155.19	1,155.19	739.32	415.87	36.00	257.00	--	672.87	8-21-16	1,155.19	58.25	22.25	--
51119	4-1903	9-10-16	1,087.50	815.17	609.00	206.17	18.96	225.00	--	431.17	10-11-16	1,087.50	39.65	20.69	5.17
51153	3-1903	9-10-16	1,087.50	815.17	609.00	206.17	18.96	225.00	--	431.17	9-30-16	1,087.50	39.65	20.69	5.17
37054	8-1902	9- 7-16	1,198.09	943.41	670.93	272.48	22.74	512.00	--	784.48	11-17-16	1,198.09	65.48	42.74	10.68
37208	7-1902	9- 6-16	1,198.09	833.37	593.75	239.62	20.00	516.00	--	755.62	11-10-16	1,198.09	63.07	43.07	10.77

Effect of adding cost of the work to current depreciated value of freight-train cars shopped for heavy general repairs -

Southern District - Sheet 5

			As of date shopped									As of date turned out of shop			
Number 1	Date built 2	Date shopped 3	Original cost 4	Ledger value 5	Accrued depreciation 6	Depreciated value 7	Condition percent 8	Cost of repairs 9	Cost of additions & betterments 10	Rebuilt value 11	Date turned out of shop 12	Cost 13	Condition percent 14	Condition percent increase 15	Increased service life (years) 16
37232	7-1902	11-27-16	$1,204.36	$ 839.64	$ 598.77	$240.87	20.00	$ 625.00	--	$865.87	1- 6-17	$1,204.36	71.89	51.89	12.97

FORMULA:

8 - Condition Percent -- Depreciated Value (7) divided by Original Cost (4).

11 - Rebuilt Value -- Sum of Depreciated Value (7), Cost of Repairs (9) and Cost of Additions and Betterments (10).

13 - Cost -- Original Cost (14) plus Cost of Additions and Betterments (10).

14 - Condition Percent -- Rebuilt Value (11) divided by Cost (13).

15 - Condition Percent Increase -- Difference between Condition Percents (14 and 8).

16 - Increased Service Life, Years - (added service life when major portion rule applies). -- Condition Percent Increase (15) divided by depreciation per annum (3%, steel - 4%, all wood).

APPENDIX NO. 14.

RECORD OF OLD SOUTHERN PACIFIC EQUIPMENT.

SOUTHERN PACIFIC LINES

Equipment Built Prier to January 1, 1890.

	Number	Average Age	Average Original Cost	Average Salvage	Per cent of Salvage to original cost	Annual Depreciation (Per cent
omotives:						
etired between January 1, 1910, and October 31, 1915.						
Converted	2	36	$9,200.00	$1,030.70	11.09	2.47
Dismantled	150	31	8,559.34	731.60	8.55	2.95
Sold	41	30	8,592.84	2,466.74	28.71	2.37
Laid aside for sale	7	33	8,037.36	* 842.96	10.49	2.71
Total	200	31	8,554.36	1,094.09	12.79	2.82
ot yet retired October 31, 1915	380	29	9,594.00			
senger-train cars:						
etired between January 1, 1910, and October 31, 1915.						
Converted	203	36	4,350.89	1,383.88	31.81	1.89
Dismantled	20	37	2,992.28	172.88	5.78	2.55
Destroyed by casualties	5	31	3,706.19	652.23	17.60	2.72
Sold	42	35	4,292.52	1,557.77	36.29	1.82
Total	270	36	4,299.23	1,307.68	30.92	1.92
ot yet retired October 31, 1915	360	32	4,135.00			
ight-train cars:						
etired between July 1, 1910, and October 31, 1915.						
Converted	554	26	590.63	224.77	38.05	2.38
Dismantled	879	28	507.15	112.93	25.50	2.66
Destroyed by casualties	160	27	564.65	183.57	33.58	2.46
Sold	82	28	459.68	207.76	45.20	1.95
Total	1675	27	536.22	169.92	31.69	2.53
ot yet retired October 31,1915	341	32	853.00			
k Equipment:						
etired between January 1, 1910, and October 31, 1915.						
Dismantled	1402	32	590.35	113.39	19.21	2.52
Destroyed by casualties	139	31	607.30	120.76	19.89	2.58
Sold	31	34	583.48	210.47	36.07	2.00
Total	1572	33	591.72	115.96	19.60	2.51
t yet retired October 31, 1915	1956	33	803.00			

Estimated

APPENDIX NO. 15.

SOUTHERN PACIFIC LINES.

Statement of number of units of rolling equipment owned, cost, depreciation, and number of fully depreciated units, at close of fiscal years ended June 30, 1914, June 30, 1915, June 30, 1916, and December 31, 1916.

SOUTHERN PACIFIC LINES

Statement of number of units of rolling equipment owned, cost, depreciation, and number of fully depreciated units, at close of fiscal years ended June 30, 1914, June 30, 1915, June 30, 1916, and December 31, 1916.

Number of units owned	Total	Steam locomotives	Passenger train cars	Freight train cars	Work equipment
June 30, 1914	64,043	2,025	2,482	54.344	5,192
" 30, 1915	60,640	2,046	2,487	51,196	4,911
" 30, 1916	56,809	1,996	2,451	47,843	4,519
Dec. 31, 1916	58,758	1,987	2,437	49,783	4,551

Original cost to date					
June 30, 1914	106,539,333	30,671,356	21,360,432	50,692,274	3,815,270
" 30, 1915	107,585,656	31,313,329	21,475,969	49,046,406	*5,749,952
" 30, 1916	106,011,545	30,976,460	21,687,550	47,658,290	5,689,245
Dec. 31, 1916	109,100,286	31,316,882	21,930,916	49,982,104	5,870,384

*Increase of approximately $2,000,000 June 30, 1915, over June 30, 1914, due to correction of error in earlier figures, in which original cost of converted equipment had been mistakenly reduced on account of depreciation accrued to date of conversion.

Accrued depreciation					
June 30, 1914	27,101,310	8,877,116	5,130,372	11,837,034	1,256,788
" 30, 1915	28,777,647	9,637,194	5,857,084	12,012,650	1,270,719
" 30, 1916	†28,705,090	9,818,231	5,698,019	11,475,697	1,713,143
Dec. 31, 1916	29,628,671	10,084,058	5,891,943	11,918,842	1,733,828

† Decrease June 30, 1916, under June 30, 1915, due to adjustment in order to have depreciation set up beginning from the first of the next fiscal year after purchase instead of the first of the next month. For the purpose of reducing the detail work of accounting for depreciation this company, with the approval of the Interstate Commerce Commission, now adjusts basing figures only annually.

Ratio of accrued depreciation to original cost to date	(Per cent.)	(Per cent.)	(Per cent.)	(Per cent.)	(Per cent.)
June 30, 1914	25.44	28.94	24.02	23.35	32.94
" 30, 1915	26,75	30.78	27.27	24.49	‡22.10
" 30, 1916	27.08	31.69	26.27	24.08	30.11
Dec. 31, 1916	27.16	32.20	26.87	23.84	29.53

‡ See note under "Original cost to date."

SOUTHERN PACIFIC LINES

Statement of number of units of rolling equipment owned, cost, depreciation, and number of fully depreciated units, at close of fiscal years ended June 30, 1914, June 30, 1915, June 30, 1916, and December 31, 1916.

	Total	Steam locomotives	Passenger-train cars	Freight-train cars	Work equipment
Number of units fully depreciated					
June 30, 1914	4,051	163	497	2,338	1,053
" 30, 1915	3,917	165	473	2,057	1,222
" 30, 1916	3,424	179	434	1,739	1,072
Dec. 31, 1916	3,474	227	428	1,663	1,156
Ratio of number of units fully depreciated to number owned:	(Per cent.)	(Per cent.)	(Per cent).	(Per cent.)	(Per cent.)
June 30, 1914	6.32	7.91	20.02	4.30	20.28
" 30, 1915	6.45	7.93	19.02	4.02	24.88
" 30, 1916	6.02	8.81	17.70	3.63	23.72
Dec. 31, 1916	5.91	11.22	17.56	3.34	26.40
Average age of equipment in service:		(Years)	(Years)	(Years)	(Years)
June 30, 1914		13	11	9	22
" 30, 1915		13	11	9	22
" 30, 1916		13	10	9	22
Dec. 31, 1916		13	10	8	22
Basis in use for depreciation charges:					
Life in years		28-1/3	(Steel (28-1/3 ((Wood (21-1/4	(Steel (26-2/3 ((Wood (20	(Steel (20 ((Wood (16
Estimated salvage		15%	15%	20%	20%
Annual rate		3%	Steel 3% Wood 4%	Steel 3% Wood 4%	Steel 4% Wood 5%

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